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THAT "GREAT PACIFIC WAR"

By George Bronson Rea

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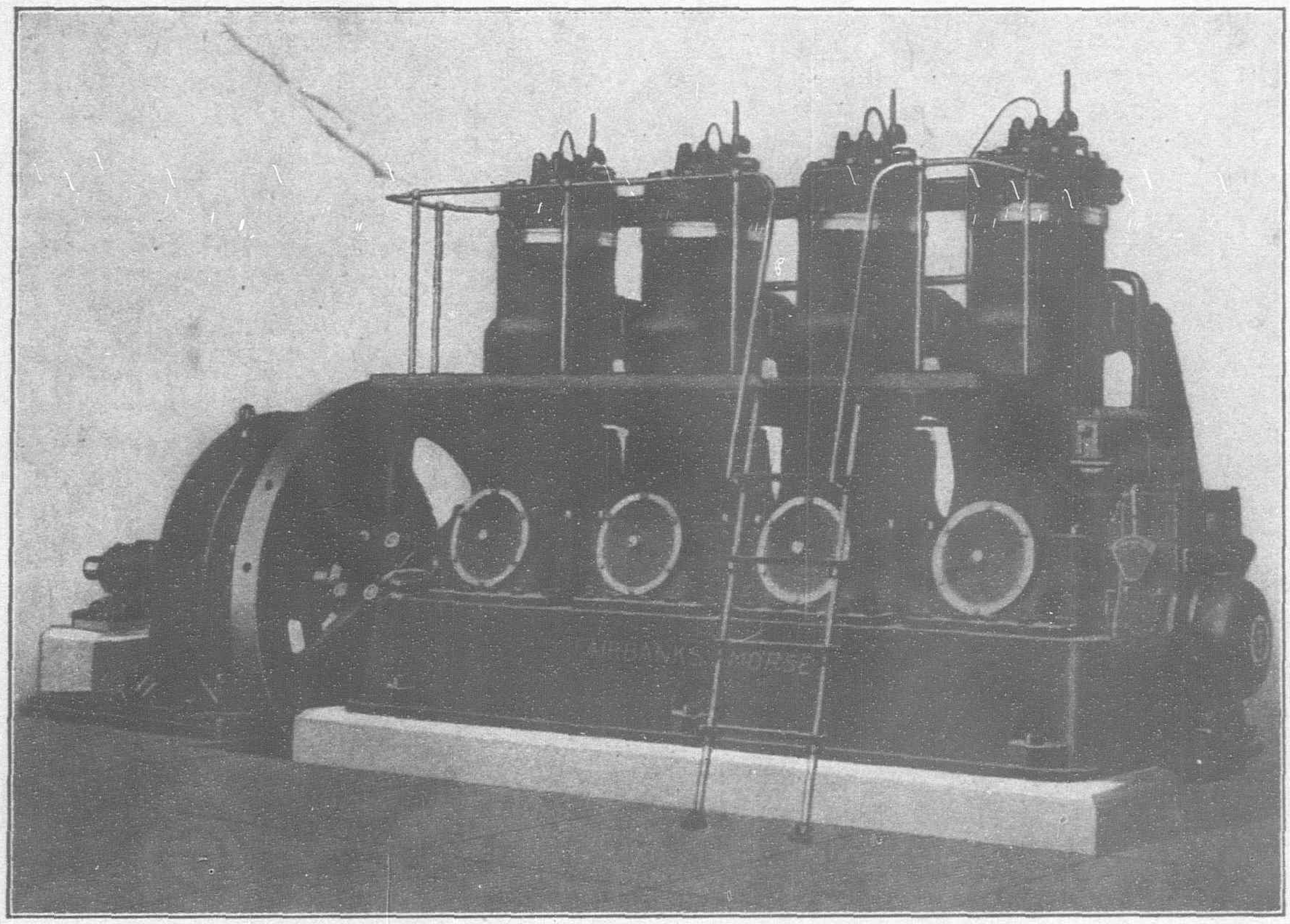

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The Far Eastern Review

ENGINEERING FINANCE COMMERCE

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That "Great Pacific War"

"The Wrath to Come"

By Geo. Bronson Rea

America and Japan have settled their differences and are now working harmoniously for the solution of Pacific problems. American capital has flowed into Japan and a new spirit of coöperation and mutual confidence has displaced former distrust, All legitimate causes for war have disappeared. A pretext for hostilities must now be based on the assumption of bad faith on the part of either government, a slander which can safely circulate only in the pages of fiction. Mr. Hector C. Bywater in " The Great Pacific War, 1931-1933 " and Mr. E. Philipps Oppenheim in " The Wrath to Come " have resorted to this method in order to hold Japan up to world scorn as a nation that cannot be trusted to keep her solemn agreements. Both writers are British subjects. The highest official spokesmen for the British Government have repeatedly declared that Japan carried out faithfully every provision of the Anglo-Japanese Alliance and cheerfully contributed her share towards winning the war for the Allies. Why do British writers at this late date insist that Japan cannot be trusted? Why do they insist on predicting war between Japan and America arising out of some act of bad-faith on the part of Japan, when they admit that neither side has anything to gain? What is behind this new trend of anti-Japanese agitation leading up to war in the Pacific? What part will Great Britain play in such a war, if it ever comes? What is the real significance of Singapore?

IN the September number of THE FAR EASTERN REVIEW, we reviewed the latest fiction from the pen of Mr. Hector C. Bywater, whose expert knowledge of naval affairs and gift of inventing international conspiracies against the peace of the Pacific has won for him the distinction of being one of the foremost naval strategists of Europe.

Mr. Hector C. Bywater is a British subject. For over twenty years the nation to which he owes allegiance was the honored ally of Japan. The partnership was entered into at a time when Russia was over-running Asia, seeking from every angle a feasible road over which to hurl her armies into the coveted plains of India. Russia's secret alliance with China in 1896, the building of the Chinese Eastern Railway, the creation of a deep-water port at Dalny, the concurrent and sinister moves of her French ally in South China together with the activities of her Belgian financial agents, had for their ultimate goal the opening of a road through China over which the Russian hordes could penetrate India from the northeast, protected by fleets based at Dalny, Kiaochau, Kwangchowwan and the ports of Indo-China. At no time in her long history, not even during the recent Great War, was Great Britain called upon to face such a formidable coalition and concerted movement to eliminate her as an Asiatic power. In those days Great Britain stood in splendid isolation, with every European power working for her humiliation.

Russia's Sinister Motive

Russia's activities in Korea and Manchuria while sufficiently menacing and provocative for Japan, were only minor moves in the greater game for the conquest of India. With all the white powers of Europe intriguing for her downfall, Great Britain swallowed her pride, cast aside her racial prejudices and accepted an Asiatic nation as an ally and full partner in the game which was being played on the political checkerboard of Asia. Placed in a similar perilous position and pitted alone against Russia, Japan might have gone under in the conflict and night have been annexed to the rapidly expanding Muscovite system. The Anglo-Japanese pact was therefore vitally and mutually beneficial to both parties, but because of her exposed position, it threw upon Japan the burden of a conflict, which in preserving her own independence and rescuing China from the yoke of Russia, consolidated the British hold on India. Japan fought and won Great Britain's war and in doing so sacrificed over 200,000 men, burdened her people with an enormous debt and then faced a still more determined war of revenge which imposed greater military burdens and hardships on her overtaxed people. No matter what political mistakes Japan may have committed in after years, which seemed to conflict with minor British interests in China, it ill becomes any fair-minded Briton to be her critic. The ledger balance is too great on the other side.

Japan's Good Faith

Japan faithfully, scrupulously and ungrudgingly carried out all the committments imposed upon her by the terms of her partnership and although she had fully demonstrated her loyalty and willingness to abide by the consequences, the British insisted that she be prepared at all times to fulfill her part in any further emergency that might arise. Under the guidance of British experts her navy was maintained at a high state of efficiency and preparedness, ready at a moment's notice to play its important role in executing the provisions of the alliance. In addition to this fraternal interest and technical direction over her naval program, British edited newspapers published in Japan, exercised a vigilant surveillance over the domestic affairs of that country, not to mention an officious and at times obnoxious censorship over her customs and general morality.

For Russia was still a menace, preparing for the war of revenge that Witte assures us was scheduled for 1912. In sheer self-defense, and incidentally to further safeguard Britain's hold on India, Japan was forced to keep pace with Russia's warlike preparations, increase her armies and be ready to meet the new onslaught. In a few years, Japan was transformed from a peaceful nation into one of the world's most formidable military machines. And for these willing sacrifices and readiness once more to stand the brunt of a war with Russia, when the time arrived to discredit her, British writers of fiction pointed to this defensive military machine as proof of Japan's aggressiveness and as the principal reason why she should be crushed. But it will strike the thinking American as a singular fact that all the propaganda leading up to this end was based on a startling hypothesis. Not Great Britain, not France, not Russia, not China or any European combination was expected to eliminate this menace to their interests in Asia. Throughout the long drawn out campaign for war in the Pacific, America was to be the catspaw for raking the European chestnuts out of the fire.

For twenty years, Japan was a protege of Great Britain, a pupil who sat at her feet and learned the rules of the international game of politics as it was then played. She was an apt scholar; a worthy disciple of a great master. For twenty years, Japan's naval policies and international political program were dictated by Great Britain. Japanese diplomacy and outlook on world affairs conformed rigidly to principles laid down by Downing Street. During all these years not one attack was made by British writers upon the good-faith and probity of their "Honorable Ally." On the contrary, Japan was extolled in words of exaggerated praise for her lofty conception of loyalty, her wonderful fighting spirit, and unexcelled patriotism of her people. British writers at that time took no chances that world opinion might be antagonistic to any ally whose loyal cooperation might at any moment become essential for the further preservation of their empire. These glowing tributes to the sterling qualities of the Japanese people and the dignity and constancy of their rulers were endorsed on every appropriate occasion by official spokesmen for the British government. Repeated assurances have been given to the world by the highest British authorities that Japan faithfully carried out every provision of the alliance and as cheerfully contributed her full share towards winning the war for the Allies. In effect, while the Anglo-Japanese Alliance was in force, the world heard nothing about Japan's alleged political immoralities from the pens of British writers.

When the time arrived, however, and it seemed good politics to throw overboard a faithful partner in order to conciliate and win the friendship of a more powerful and desirable ally, British writers were smitten by an epidemic of amnesia. With some notable exceptions, British experts on Far Eastern questions ignored all that had gone before. In their haste to discredit Japan they overlooked that her highly magnified and distorted international sins were traceable in large part to twenty years of intimate association with the policies of their own government, disregarding the obvious conclusion that if the Japanese had changed overnight from a bosom friend and bed-fellow into an enemy to world peace, they themselves stood self-accused before the world of having concealed and condoned her alleged political shortcomings when their own interests were in jeopardy.

Naturally, there had to exist a very powerful and compelling motive to justify this rather startling change of front and a reason was found in Japan's activities in China. We have very fully exposed in the pages of this magazine the salient features of the campaign having for its object the precipitation of a "show-down" in the Pacific, in which hysterical Americans coöperating with a group of enthusiastic Britons, saw in such a possibility the elimination of Japan as a factor in the future industrial development of China.

The intensity of this skilfully directed, utterly misleading and one-sided anti-Japanese propaganda was successful in destroying British confience in Japan and worked the Americans up to such a high pitch of emotion that hostilities seemed inevitable. Japan was held up to world scorn and reprobation, branded as another Germany in order that when the conflict came she would stand alone, friendless and bereft of sympathy, aid or consolation from neutrals.

A Powerful Propaganda

The acknowledged leader of the British war propaganda visited the Far East at that time collecting ammunition for the new Anglo-American crusade and after consulting with the anti-Japanese leaders determined to lend his powerful aid to the campaign then in full swing. The first step in the drama which would permit Great Britain to remain neutral when America called for a "show-down" in the Pacific, was the cancellation of her alliance with Japan. In order to create a sentiment in support of this move, it became necessary to discredit Japan, tarnish her good name and accuse her of disloyalty to British interests in China, occasion for which was found in one of the Twenty One Demands on China in which Japan desired certain railway concessions in the Yangtsze Valley, at that time held by the British as their own special preserve, despite the fact that they had previously shared their interests with the French, Germans, Belgians and Americans and that Japan had advanced over Yen 30,000,000 to the Hanyehping corporation and obtained a first mortgage on its valuable coal and iron mines and steel plant situated in the very heart of the Yangtsze region. The exigencies of the post-war international situation and the demand for a closer alliance between the two great white powers, called for a complete revulsion of British sentiment towards a faithful ally, the disavowal of previous eulogies and a withdrawal of moral support. This task, Lord Northcliffe, evidently set out to accomplish when he transformed *The Times* from the apologist and champion of Japan into her most biassed critic.

But with all this concentration of heavy journalistic artillery on the heads of the Japanese, the propaganda to provoke hostilities in the Pacific succeeded only in part. Thanks to American commonsense and the high order of American and Japanese diplomacy which characterized the Washington Conference, the main objective of the campaign was made impossible of realization for ten years and a rapid change for the better in the relations between Japan and America has since effectively destroyed any possibility that a similar campaign can be successfully renewed. The campaign was effective only in so far as it prevented a renewal of the Anglo-Japanese Alliance. Instead of isolating Japan in advance of the "show-down" with America, the British swapped an alliance with teeth in it which very adequately protected their vital imperial interests for a Four-Power substitute whose molars were scientifically and painlessly extracted by a skilled American dentist.

British Merchants Lose

The real losers in this game of diplomatic and journalistic wits are the British merchants and manufacturers who have seen their former splendid trade with Japan handed over to American competitors without acquiring compensating advantages in China, where, owing to Japanese activity, their hold on the cotton goods market is being rapidly undermined. Instead of demonstrating practical appreciation for the British attitude in cancelling an alliance which they and their British sympathizers had vehemently declared was responsible for all their political woes, the Chinese lost no time in turning on their friends the tactics so successfully employed in penalizing Japan through boycotts, strikes, demonstrations, inflammatory handbills and vicious journalistic propaganda.

The British authorities in Hongkong recognizing the gravity of the situation, did all in their power to avert the impending storm by extending the glad-hand of friendship to Dr. Sun Yat-Sen and offering to work in cooperation with Canton. All their efforts at conciliation were negatived by a persistent and vituperative campaign directed by British journalists in Peking against the southern leader. Sun Yat-sen retaliated and British commercial interests paid the price. After inflicting serious losses on British shipping and commerce through strikes and boycotts, Sun Yat-sen threw in his lot with Soviet Russia and made his wing of the Kuomintang party the instrument for bolshevising his country. Exact figures are unobtainable, but it is not far from the truth to state that for every yen lost by Japan as a result of the anti-Japanese boycott, British interests in China have since suffered to the same extent in Mexican dollars.

British Government Aloof

The remarkable feature of this campaign is that at no time since its inception has any responsible official of the British government publicly endorsed, even by inuendo, the charges of bad-faith hurled against Japan. The campaign launched in Peking during the last year of the Great War and waged with such intensity until silenced by the Washington Conference, compelled Japan to retire from her positions in Siberia and Northern Manchuria, destroying the only bulwark between China and the onward march of Bolshevism and opening wide the door for the unobstructed reëntrance of Russia into her old position in Eastern Asia. The result of this misdirected activity is now before the world. China lies prostrate, a hopeless wreck, overrun and governed by the jackals of Moscow.

We return once more to the almost identical political situation in Asia which brought Japan and Great Britain together a quarter of a century ago for the defense of their threatened interests. The clock has been turned back. Once again, Russia is knocking at the gates of India, not with the butts of her rifles but with the gentle tapping of her more formidable weapons of intrigue and propaganda. Central Asia is a network of Soviet republics. Chinese Turkestan and Mongolia (integral parts of China) have been annexed to the Soviet system and the disintegration of China proper is proceeding with alarming rapidity under her sledgehammer blows. Japan's vital economic interests in Manchuria and Eastern Inner Mongolia are placed in grave peril but there is now no Anglo-Japanese alliance to comfort and aid her. The consortium agreement compelled Japan to surrender her outer line of defense against the " menace from the direction of Urga " and then the Eight-Power treaty stripped and exposed her to the comeback of her old enemy. Once again, it begins to look as though Japan may be called upon to defend her economic existence and repeat history on the plains of Manchuria by becoming the instrument that will check the onward march of Sovietism in Asia and the eventual overthrow of Great Britain in India.

The responsibility for this grave and distressing state of affairs goes squarely back to those masters of British propaganda who, playing the Chinese game of international politics, failed to understand the psychology of the American people. With this introduction we can return to Mr. Hector C. Bywater.

The Washington Conference

The Washington Conference brought peace to the Pacific for a period of ten years and insured the four interested powers against a conflict in this region by a limitation of naval armaments which made it strategically awkward for the smaller Japanese navy to engage the American fleet with any hope of victory. This pact was reinforced by a further Eight-Power treaty which recognized the full sovereignty of China, abolished spheres of influence and special privileges and presented the tottering republic with a new Magna Charter. The significance of this supplementary but equally important undertaking has been studiously ignored by many writers whose interest in the Washington proceedings began and ended with the pact for the limitation of naval armaments. It is well to recall however, that not content with writing an insurance policy guaranteeing the peace of the Pacific for ten years, American diplomacy made assurance doubly sure by eliminating through the medium of the Eight-Power pact all possible causes for war with Japan over China.

The war scare, based on a suppositious violation of China's integrity by Japan, in which America was to pose as the champion of China was brought to an abrupt termination. No intelligent anti-Japanese agitator, no matter how rabid he may be, would have the audacity at this late date to resurrect this bogey as a reason why America should fight Japan.

But the lull in the war propaganda was only of short duration. Hardly two months had elapsed after the closing of the Washington Conference when a new peril was conjured up to keep alive the flagging war spirit in America. This time an entirely novel angle was given the situation. Accusations began to appear in the world press that Japan had embarked on a secret naval construction program in open violation of the spirit of the treaty, building a fleet of auxiliary vessels which would even up the discrepancy in the capital ship quota allotted to her.

It was rather an extraordinary situation. The American government maintains a very elaborate embassy in Tokyo staffed with expert military and naval observers supplemented by a competent and wideawake consular corps and commercial service. In addition, there are a number of student interpreters attached to the diplomatic service and several army and navy language officers studying in the country. Several very clever correspondents of leading American newspapers and news syndicates make Tokyo their headquarters for the Far East, and very little of importance escapes their keen notice. Scores of American businessmen and missionaries familiar with the language and possessing the full confidence of the Japanese enjoy unusual facilities for knowing what is going on in that country. Yet with these superior advantages for accurate observation on the part of Americans it is rather illuminating to ponder over the fact that the reports which once more charged the Japanese with bad-faith emanated from British sources.

A Secret Treaty

It was only a few months prior to the discovery of this situation that the American people learned for the first time of a secret Sino-American treaty of alliance drawn up in Peking in anticipation of hostilities between Japan and America. The treaty was complete in every detail of military and naval cooperation. The Chinese were to hold the Gulf of Chihli, embarass the Japanese and keep the road to Peking open pending the arrival of the American expeditionary forces. China was to place her ports at the disposition of the American fleet and supply food and war materials. The real fighting was to have been done by the Americans, thus duplicating China's pervious secret treaty of alliance with Russia in which she handed over her territory and ports and conceded the railway rights for the Russian armies to get into a favorable position to crush Japan.

The facts surrounding the existence of this interesting document were given to the world in a book written by " Putnam Weale," one of the British advisers to the Chinese Government. A fuller and more elaborate official report to the President of China describing his work abroad during the Washington Conference, subsequently appeared in the British edited *Peking and Tientsin Times*. The publication of these secrets revealed an almost unbelievable situation. No American in Peking had ever heard of this remarkable treaty! Officials of the American legation, the American naval and military attaches and the American advisers to the Chinese Government had been maintained in complete ignorance of the existence of such a document and Washington was equally unconscious of the important role assigned to the United States in this amazing partnership.

Failure on the part of the American legation at Peking to attach sufficient importance to the story and deny it as soon as it appeared, provided an opportunity for the Japanese Foreign Office to bring it to the attention of the American ambassador at Tokyo, who cabled the story to Washington. The response that came sizzling back over the wires from Washington authorized Ambassador Warren to deny *in toto* the facts as stated and sent him post haste by the next express train for Peking, where, from all reports, he read the riot act to a group of Americans who had permitted themselves and their government to be placed in such a rediculous position. Investigation disclosed that the British adviser to the President of China had drafted the treaty of alliance in anticipation of the hostilities which then seemed unavoidable and when abroad on an official mission connected with the Washington Conference, exhibited the document to the Prime Minister of Canada and other high British officials in order to strengthen his own propaganda for the cancellation of the Anglo-Japanese Alliance.

Now it may have been pure coincidence that the American people should be again informed through British sources of a new menace to their security in the Pacific. We can let it pass at that and also ignore the reflection cast upon the intelligence and usefullness of our trained diplomatic, military and naval observers.

The new charges of bad-faith brought against Japan, were sponsored by Mr. Hector C. Bywater, author of " Sea Power in the Pacific." Mr. Bywater accused Japan of embarking on a large program of cruiser construction in addition to building a fleet of auxiliary vessels whose relative valve had been proportionately increased by the restriction of battleship tonnage, thus violating the spirit, if not the letter, of the Washington Conference in a manner which very materially affected the efficiacy of the agreement. Once again, Japan was held up to world criticism for alleged disloyalty to a solemn treaty and notwithstanding that the charges were very fully and satisfactorily answered by responsible Japanese naval authorities, the story served its purpose in the great game of propaganda directed by the world's masters of the profession. Such charges had the desired effect of fanning into a blaze the dying embers of American resentment against Japan and a new war campaign was opened with greater vigor. Aided by advocates for a greater American navy in pressing for larger appropriations to meet the changed situation, the campaign grew in intensity until President Collidge proposed a new conference to check the growth of minor naval armaments, a plan which received such lukewarm support from the interested powers that it had to be abandoned. After all, there was no great secrecy surrounding Japan's new naval program. She had no difficulty in convincing her partners in the armament part that her much criticized activities were well within the quota assigned her.

There is another side to this picture. A Japanese viewpoint which by the application of the same logic places British and America in the position of violating the spirit of the Washington Treaties, and fully justifying Japan in taking any measures to protect herself.

Singapore and Pearl Harbor

Confiding in the honor of America and Great Britain, Japan cheerfully accepted the 5-5-3 program handing over world naval supremacy to the Anglo-American fleets and placing herself in a hopelessly inferior position in the event the combination turned on her at some crisis arising out of the perennial racial controversy. The mere fact that Japan gracefully and unconditionally signed away her power for aggression, is the strongest evidence that she will never carry the racial question to the point of inviting swift humiliation and defeat from the combined white powers.

Notwithstanding this pledge of peaceful intent the armament treaties had not yet been ratified when to Japan's consternation, a furious campaign was opened in the British press and parliament for the immediate construction of a huge naval base at Singapore followed by a similar agitation in the United States for an equally formidable naval stronghold at Pearl Harbor. After stripping the Japanese of their power of defense they were to be hemmed in by the two great white naval powers, their surplus population denied an outlet in the Paciffic and by the operation of the Eight-Power treaty, deprived of their legitimate hope of expanding economically in China. Viewed from this angle, the Japanese saw themselves set apart as a race prohibited from participating on equal terms with other peoples in the struggle for existence and viewed with justifiable alarm the closing of the net that would terminate their career as a great power.

There had been too much anti-Japanese propaganda leading up to the abrogation of the Anglo-Japanese alliance. The Japanese did not forget its significance. Nor could they disregard the clear and unmistakable warning conveyed in the call for white unity against the Asiatic menace, a cry so strong and determined from her white dominions that Great Britain reluctantly sacrificed her alliance with Japan in order to save her empire from disruption. Imagine then the amazement of the Japanese, when, in addition to all the other strategical arguments advanced to defend the immediate construction of the Singapore base, they read in the British press that in the event of war between Japan and America, Singapore would become the operating base for the American fleet!

Was this the reason America so willingly abandoned her plans for fortifying the Philippines? Was the plan proposed by Secretary Hughes on the opening of the Washington conference arrived at after a secret understanding with Great Britain? When we enter the realms of fiction and invent plausible reasons for accusing another nation of bad-faith, deceit and sinister designs, Japan is equally entitled to indulge in flights of fancy and conjure up phantoms against her security that place America and Great Britain in a most unenviable light. It is necessary to emphasize this aspect of the Singapore base as it has an interesting bearing on our further review of Mr. Bywater's latest fiction.

The storm created by the naval scare, however, soon blew over. Japan and America settled down with a firm resolve to smooth out their differences and strengthen their commercial ties. The Asiatic Exclusion Act seemed to offer an opportunity to resurrect the war scare, which in view of Japan's pledge embraced in the armament pact, failed of its purpose. Americans became more and more convinced of Japan's good-faith, correct deportment and desire to be friendly. A complete and harmonious understanding between Washington and Tokyo in regard to China superseded mutual distrust of each other's aims in that country. The American and Japanese financial groups faithfully reflected the attitude of their respective governments and on the foundation of this new confidence, American capital began to flow into Japan. The earthquake disaster brought to the surface the real American sentiment towards Japan and cemented the bonds which even Japanese indignation over the exclusion act was powerless to break. Several Japanese loans were successfully floated on the New York market and the co-operation of American capital in important Japanese industrial enterprises completed the great work of the Washington Conference. All reasonable causes for war between the two nations has been eliminated. A pretext for hostilities can exist only in the pages of fiction. So we return once more to Mr. Hector C. Bywater.

"No Trespass"

In emphasizing the labors of Mr. Bywater we desire to draw attention to the fact that now when all plausible pretexts for war between Japan and America have been happily eliminated and the two nations are drawing closer and closer together in bonds of mutual understanding it is unpardonable for an outsider to persist in prolonging a propaganda, which, to be effective and convincing, must be based on the assumption of bad-faith on the part of Japan. The honor and good-faith of Great Britain and America are accepted in Anglo-American literature as sacred and inviolable. The villian in the international plot is always a subject of the hypothetical foreign enemy who can be insulted with impunity. There is little chance that a Frenchman, a Spaniard, a German or a Japanese writer with a sufficient command of English will retaliate by writing a book in which the villian is an American or an Englishman, and even if he did and found a publisher for his insults, the book would be considered as a piece of rank impertinence. It is quite safe to insult the Japanese. There are only a few hundred who might read the original story in English and of these, perhaps only a score have sufficient knowledge of the language to answer back.

There may be some legitimate excuse for Americans and Japanese to discuss in print the probability of a war in the Pacific arising out of differences between their own countries, but we can see no justifiable reason why outsiders should intrude in the controversy and feed the fires of hate by inventing situations founded on the gratuitous assumption that Japan's conception of international political morality is such that she cannot be trusted to live up to the terms of a sacred treaty. For this is exactly what has happened ever since the first impetus was given to the war propaganda by its original promoters and time has proved that all of their charges were based on false promises. Reasons for war which never entered the heads of Americans have been invented out of whole cloth, given wide publicity in the press of Europe and cabled to America by news syndicates and there accepted as further evidence of Japan's bellicose intentions.

European opinion is practically unanimous in that Japan and America must fight. Nothing can shake that belief and every incident that can be twisted to support this view is employed to fortify this conviction. The wish is undoubtedly the father to the thought. If America and Japan would come to grips in the Pacific, the European war-debt controversy would come to an abrupt termination. The gold that rolled into the coffers of Japan and America during the great conflict would then roll back to its original strong-boxes in Europe. The debt would be evened up. Japan would be so seriously crippled financially and industrially as to eliminate her for another quarter century as a competitor in the markets of Asia. American shipping in the Pacific would disappear and the trade and development of China handed over to Europe. The real losers in such a conflict would be the two combatants. The fruits of victory would go the onlookers. It is not difficult to understand the selfish European viewpoint or the stimulus behind this propaganda. The dogged persistence with which European writers still seek to find causes for war in the Pacific is strong evidence that these gratuitous insults to Japan are circulated for the sole object of poisoning the American mind and preventing a full and amicable solution to the problems confronting them both.

In selecting Mr. Hector C. Bywater as our special object of criticism, it is because he has created a school of writers who accept his theories to substantiate their predictions of war. Following up his original accustations that Japan was secretly building a fleet of auxiliary vessels that would even up the discrepancy in her capital ship allottment, Mr. Bywater has written a new technical novel entitled " The Great Pacific War, 1931-1933."

Mr. Bywater's Prophecies

In his introduction, Mr. Bywater confesses that the book was not written to support the view that such a conflict is either close at hand or inevitable. He admits that the Pacific horizon is fairly free from clouds, but if war between Japan and America is happily improbable, it remains a contingency that cannot be dismissed as wholly impossible. Now war between America and Great Britain is also within the bounds of possibility. So is a war between Great Britain and Japan. War between any two nations is always a possibility and for that very reason every nation maintains a general staff whose duty it is to consider every other nation a hypothetical enemy and prepare plans in advance against the possibility of war. Yet with all these possibilities for war in the world no serious writer has undertaken the task of portraying in detail the progress of such a calamity. Why a British authority on naval affairs should employ his technical knowledge to describe a war between Japan and America instead of a war between his own country and Japan is a question that should set Americans furiously to think. It can be demonstrated that there exist more points of contact between Japan and Great Britain than between Japan and America; yet if an American should capitalize these differences by writing a book describing a war originating in some act of bad faith on the part of Great Britain, British opinion would instantly condemn it as an unwarranted piece of mischievous propaganda.

After carrying his readers through the mazes of a most interesting naval campaign to the defeat of the Japanese fleet and end of the war, Mr. Bywater concludes his book with a truism already grasped by every intelligent American and Japanese. There is nothing to gain on either side from such a conflict. The victor loses as much, if not more, than the vanquished. If the book was written in the interests of peace, the closing paragraph is its only justification.

The author is too high an authority on naval affairs for a layman to pick flaws in the technical side of his story. However, these is just one point he is ominously silent on. The two inside cover pages of the book show a map of the Pacific area on which all the American and Japanese naval positions are clearly printed. The map is cut at its western extremity at a point just east of and excluding Singapore. In the text of the book all reference to the huge British base at this point is studiously omitted and the crux of the naval campaign so minutely described, lies in the efforts of the American navy to reestablish a new base of operations at Truk after having lost the Philippines and Guam. Remembering the crusade for an Anglo-American alliance for the mutual defense of white territories in the Pacific against the Asiatic menace as represented by Japan and the loud demand for a suitable base at Singapore which, amongst other things, would serve the American navy in the event of being driven out of the Philippines in the opening stages of a war with Japan, one wonders why reference to its existence is omitted in the imaginary history of the Great Pacific War of 1931-1933. After all the propaganda leading up to such a war and the implied assurances on the part of British writers that Great Britain would stand with America, it is illuminating to read through the pages of a book written by the foremost British naval expert and discover that he avoids all reference to these matters and cheerfully leaves the job of crushing Japan to an American fleet which must wander around submarine infested seas, and find a new base in the Mid-Pacific, when the wonderful British base at Singapore is just around the corner of his map. Mr. Bywater tells us in so many words that in the event of such a war, America must fight Japan single-handed, an assumption that cannot bear even a moment's serious scrutiny.

The Philippines

Under American rule, the Philippines stand as the guardian of the British empire in Asia, a guarantee that India, Australia, New Zealand and the Straits Settlements will not be menaced by an Asiatic power. As long as America remains in the Philippines her presence there is a pledge of their absolute neutrality, an assurance that the British empire is reasonably safe from a menace coming from that direction. If Japan is now the hypothetical enemy of Great Britain in Asia, the United States has stepped into Japan's place as the guardian of Britain's empire and, if, in the event of a war with Japan she should lose the Philippines in the opening stages of the campaign, the menace to Australia, India and the Straits Settlements would loom so great that the much talked of Anglo-American alliance would become operative immediately and the homeless American fleet find a safe and snug base of operations in the highly fortified harbor of Singapore. To reason otherwise and write a book outlining the details of a conflict in which Americans single-handed would fight Japan in order that the sole beneficiary would be Great Britain, is equivalent to politely telling the Americans *that they are a nation of drivelling idiots*. In a war which Mr. Bywater confesses that neither side had anything to gain and in which common sense tells us that victor would be his own country, it is sheer lunacy to assume that the Americans would be so bereft of common sense as to play the role assigned to them in his imagination.

As long as Mr. Bywater sticks to naval strategy he is safe from serious criticism but when he leaves his own sphere and treads the maze of Far Eastern politics he becomes hopelessly lost. The favorite cause of war between Japan and America is invariably mixed up in some way with a possible Japanese violation of the Open Door principle in China and Mr. Bywater creates an imaginary instance to bring matters to a head in the great conflict of 1931. He says:

> " In October the Peking Government granted to an American syndicate, headed by Mr. Waldo Sayers, the well-known New York financier, a concession to work the Green Mountain iron and coal fields of Kiangsi, an upper province of the Yangtsze Valley, where exceptionally rich deposits had been located by American prospectors. Japan forthwith addressed a note of protest to Peking, pointing out that since the district referred to was one in which Japanese had hitherto been recognized as paramount, the validity of this concession to the nationals of another power could not be admitted by her. The Chinese Government in reply, pointed out that Kiangsi province was not mentioned as a Japanese enclave in any existing convention or treaty between the two countries, so that the Chinese Government was fully justified in granting such a concession to the American syndicate. The Japanese rejoinder to this note was brusque, and even threatening, but Peking stood firm. There the matter rested for the moment while Mr. Sayers continued his preparations for developing the concession, though the Japanese press boasted in violent language that he nor any other foreigner would be permitted to raise a ton of coal or iron from the Kiangsi mines,"

Japan's Losses in China

This sounds like a good case against Japan. Mr. Bywater intentionally selects a possibility that would most certainly draw forth a vigorous protest from Japan and then carefully conceals the other side of the story which justifies her action. No question of the Open Door is involved in such an imaginary controversy, but there is a very clear case of equity, briefly stated, the Japanese have advanced to date over Y.45,000,000 to the Hanyehping Corporation and hold a first lien on its valuable coal and iron mines in the Kiangsi region and on its steel mills at Hanyang. The original loan of Y.25,000,000 was made in 1913 since when, the Japanese have been compelled to pour further millions in order to keep the company afloat and save their investment. At no time since the original loan was defaulted have they been able to foreclose their mortgage or even assume technical direction over the properties that would place them on a paying basis. Supported by an anti-Japanese foreign opinion, the Chinese have steadily rejected all propositions that would hand over control to the Japanese, who are forced to watch their huge investment depreciate without hope of intervening to save it.

As with the Hanyehping properties in Kiangsi, so with the Kiangsi Provincial Railway, which owes the Japanese over $15,000,000 and cannot meet even the interest, let alone repay the principal. The Japanese cannot foreclose their mortgage or take over the management and operation of the line. Over Y.60,000,000 of Japanese capital is therefore secured by properties situated for the most part in the Kiangsi region, the only return being the insufficient cargoes of iron ore, which under the terms of the original Hanyehping loan agreement, are shipped from Tayeh to Japan.

Past experience tells us that the Chinese would jump at the chance to involve Japan with America over the Open Door principle in exactly the manner predicted by Mr. Bywater in his book, and in view of their investments in Kiangsi, it is a foregone conclusion that Japan would vigorously protest a concession to American or any other capitalists to work the iron and coal fields of the Kiangsi region unless her own rights to equal opportunity were immediately recognized. Japan would not object to a dozen American syndicates working the mines of Kiangsi, but she would undoubtedly insist upon the liquidation of her outstanding loans on similar properties in the province, or be conceded the right to foreclose or take over their operation. Mr. Bywater's selection of an imaginary *casus belli* is therefore not a happy one. America is not going to war with Japan or any other nation over a Chinese concession. The trick has been played before but failed to work.

But if America should see no menace to the Open Door principle in such a move, how about Great Britain ? Why should not some case arise that would bring the British into war with Japan over similar matters ? Suppose, for instance that a Japanese syndicate secured a concession to work the coal and iron mines of Kwangtung province, which Hongkong hopes some day will serve as the basis of a great iron, steel and shipbuilding industry in the colony ?

Let us suppose that Japan duplicated the Cassell concession and deprived Hongkong of its cherished dreams of development: what would happen? Would the British yell for war with Japan? Suppose Americans forstalled the Japanese, would it destroy friendly relations between the two countries ? Why are Americans credited with being the only imbeciles who would fight over a Chinese concession ?

The Open Portals

The door to equal opportunity in China has stood open for twenty seven years and every American who has passed through its portals to explore the other side has been goldbricked. The Open Door has been a standing invitation for unsophisticated Americans to enter and drop their wad. Not one American has carried through a Chinese concession, for the simple reason that in every case the contract concealed a joker that made it necessary for the United States to go to war with some other power enjoying prior rights in the premises. Outside of our participation in the Hukwang Loan (obtained only after President Taft issued a friendly ultimatum to the Prince Regent of China) not one cent of American capital is invested in China's railways or major industrial enterprises. Our stake in the country is purely an academic one and our continued interest in the preservation of the Open Door principle arises from a hope that some day in the distant future the Chinese market and investment field may be necessary to our economic welfare. Although it is highly probable that America would view with grave concern any attempt to deprive her trade of equal opportunity in China, she would not be stirred over the loss of a concession.

It can be demonstrated by actual figures that American interest in China is not so much a question of trade as it is one of philanthrophy. China is America's pet charity, our favorite field for the expenditure of surplus millions in missionary and educational work. For every dollar in profits derived from exports to China, Americans spend two dollars in uplift work amongst the Chinese people, giving employment to an army of men and women who outnumber those engaged in the pursuit of commerce. American policy towards China is moulded by its citizens who have the greatest stake in the country, and our diplomatic envoy is selected for his special fitness to represent the educational and missionary element. It is only necessary to recall President Wilson's rejoinder to Mr. Morganthau when the latter expressed the desire to be appointed minister to Peking instead of to Constantinople, to appreciate that our philanthropic interests in China are of far greater importance than our trade. When war alarmists base their arguments on some probable infraction of the Open Door as a reason why America must fight Japan, they overlook the essential truth that a change must come over our trade relations with China to the point where the stake is worth fighting for. It is inconceivable that America would go to war over a principle, which, on analysis, resolves itself into a right to continue in business as a charitable institution.

It is also well to bear in mind when discussing the possibilities of a war with Japan arising out of some infraction of the Open Door principle, that American trade with China does not conflict in any essential or basic commodity with Japanese products. Exact figures are perhaps difficult to obtain, but it is not far from the truth to state that a large percentage of America's trade with China is carried on by Japanese firms whose activities as agents of American manufacturers have materially contributed towards expanding the Chinese markets for out products. There are at present absolutely no points of contact between Japan and America in the Chinese market which might lead to serious misunderstanding, and as the years pass, a much stronger spirit of co-operation may be expected to characterize these relations.

Japan's Preponderance

Those who have the most to lose from the keen competition of Japan in the Chinese market are not Americans. Japan controls about sixty percent of China's textile industry and with the product of her domestic looms is a very formidable rival to Manchester for the China piece goods trade. Japanese steamers engaged in China's coastwise and riverine services have taken much profitable traffic from the older established British shipping interests. Japanese investments in China in the aggregate are probably greater than those of Great Britain. The day is rapidly drawing nearer when Japan's trade and investments will give her the preponderating influence in the country, a fact that will automatically strengthen her diplomatic position in any future international conference convened to discuss Chinese affairs. The time will arrive when the other interested powers must concede the leadership to the nation with the greatest stake in the country.

In every way the nation that has the most to gain from the peaceful development of China under the Open Door principle, is Japan. In the struggle for existence, which by reason of American and British Asiatic exclusion laws forces her increasing population to seek an outlet on the mainland of Asia or to remain at home and solve their problem through industry, together with the need for a nearby field for the investment of capital that will insure a steady stream of raw materials for her mills and factories, the good-will and friendship of the Chinese people is a pre-requisite to Japan's growth and prosperity.

It is folly to assume that a nation with so much to gain would deliberately throw away its chances of success by any act which might invite the lasting hatred of the Chinese people and destroy its international standing by flagrantly breaking a solemn treaty. As long as Japan adheres to her present policy towards China and works in complete harmony with America for the maintenance of the Open Door principle, the peace of the Pacific is in no danger of being broken. When, in addition, we have the most positive assurance that Japan will never carry the racial issue to the point of hostilities, a certainty evidenced in her cheerful acceptance of an inferior naval status, it is reprehensible in the extreme to continue a propaganda based on the assumption that Japan will provoke a crisis by some act of international badfaith.

One more point is worthy of emphasis. In recognizing China's full sovereignty in the Eight-Power Treaty, she may now grant concessions to develop any part of her vast territory in the full assurance that no government which formerly enjoyed preferential rights in any particular district can legitimately protest her action. Even the consortium agreement binding the American, French, British and Japanese banking groups to work together in financing China is at variance with the strict interpretaion of the Eight-Power pact, and if China's finances were on a firmer basis, this one limitation to the full exercise of her sovereign powers would automatically disappear.

"The Wrath to Come"

It is difficult at times to sense just where propaganda begins and ends. The literature leading up to the Great War is ample proof that the slow process of tarnishing the character of a prospective enemy before the conflict can be carried out more safely and thoroughly under the guise of popular fiction than in open and frank newspaper criticism. It is not surprising therefore to find that some brilliant writer has appropriated the ideas of Mr. Bywater and worked them into a popular novel. So we have " The Wrath to Come " from the pen of that " prince of British story-tellers and master of plots," Mr. E. Philipps Oppenheim.

The plot of " The Wrath to Come " is woven around an imaginary secret pact between Japan, Russia and Germany, in which Japan in flagrant violation of a limitation of armament treaty, exceeded her quota of marine tonnage by two hundred and fifty thousand tons in addition to building at a port on the Chinese coast leased to her, or on an adjacent island, a score of flying ships of a new type designed for offensive purposes. In Mr. Bywater's book, Japan, as early as 1925, was building a fleet of submersible cruisers from designs prepared in Germany, but Mr. Oppenheim, with a more vivid imagination, converts these into aerial monsters. In every other way, Mr. Oppenheim carries the charges of Mr. Bywater to their logical conclusion presenting Japan in the altogether despicable role of violating her solemn treaties with the other naval powers and combining with Russia and Germany for their downfall. It is a typical Oppenheim story and but for one insignificant slip on the part of the author might pass for an innocent piece of fiction.

The villian of the story is a Japanese diplomatic attache by the name of Itash, a Japanese word in which the last letter is obviously deleted. The Japanese word "*itashi*" means a skunk and Mr. Oppenheim in making his puppet live up to his name, gives us one of the most detestable characters of recent fiction. Imagine the disgust and indignation of an American or Briton in picking up a foreign novel to find his government portrayed in such a villianous manner and one of his diplomatic officials depicted as the cheap villian in the plot and answering to the name of Mr. Skunke or Mr. Polekat! Yet this is exactly what Mr. Oppenheim has done to the Japanese in "The Wrath to Come."

This one slip on the part of the "prince of story tellers" cannot lightly be explained away and when viewed in connection with Mr. Bywater's contribution to fiction constitutes strong evidence that the masters of propaganda are insiduously poisoning world opinion against Japan in advance of the great Pacific war which the boob Americans are expected to fight single-handed and see the fruits of victory handed over to others.

Is the British Boxer Indemnity to be Wasted?

Commission Now Meeting in China to Determine How Fund Is to Be Used

WHEN the United States remitted her share of the Boxer indemnity for educational purposes, she gained in goodwill among the Chinese people. At that time the Chinese over-looked the fact that strings were attached to the American arrangement. With the exception of the amount which was used for the erection and maintenance of Tsing Hua College in Peking, all the money was to be spent in the United States. Large numbers of Chinese were to be sent to the U.S. every year to study in American colleges and to return to China slightly denationalized but with an American slant at life. As Professor Beard, of Columbia University, is reported to have said during his visit to China, these students were educated to be good Americans, for after all, the courses in the American universities, particularly in under-graduate colleges, were designed for American boys and girls and not for Chinese. In their courses in English the students are required to study Beowulf, although one can hardly understand what advantage it is to a Chinese to familiarize himself with Anglo-Saxon. In the courses in economics, all examples are taken from current American commercial and financial conditions which are of doubtful utility to the student who returns to China. In the courses in politics the student becomes familiar with the workings of Tamany Hall in New York and similar organizations in other cities, which can help him very little in service to China unless, as has been occasionally suspected, he attempts to apply Tamany methods to Chinese politics.

For almost twenty years, thousands of Chinese have been studying in American colleges and universities, some of very doubtful scholastic value and it is a mooted question whether the students have benefited except in the very large sense that all human beings benefit by education and travel.

The American Plan

When in 1924 the remaining balance of more than six million gold dollars was remitted to China, by the United States a board of trustees of ten Chinese and five Americans was appointed for the purpose of determining a new and different method of spending the American share of the Boxer indemnity. This board is still meeting in China and by all accounts the new funds will be spent, not in the United States but in China and will be utilized, not in a helter-skelter sending of Chinese youths to the United States but for a specific type of education for the development of Chinese, mainly scientific education. *The fact that this board of trustees has determined upon a change, might be accepted as an indirect criticism of the system prevailing, but the American government has even more definitely gone on record as disapproving the uncontrolled education of Chinese in American colleges. Under the new Immigration Act, Chinese students going to America are required to have an entrance certificate of admission to a selected list of colleges and universities. In other words, the Chinese who is unable to pass his examinations, cannot go to the United State to waste his time and his country's money in the pursuit of jazz and the study of Vanity Fair.* Also, Chinese students are not encouraged to select half-baked onehorse town colleges, which from a scholastic standpoint, are not the equal of many a missionary university in China.

What ever may have been the shortcomings of the system employed by the U.S. in the expenditure of its share of the Boxer indemity, the act of return was generous, the spirit motivating it was friendship for the Chinese and the advantage to the United States has been that uncertain and indefinable friendship which all foreign Powers seem to seek with China and which the United States is reputed to possess.

Shall Britain Lead or Follow?

No other nation returning the Boxer Indemnity to China in the same way as the United States returned it, can gain the same kudos which came to the United States through her act. The other nations *will have to do more; they will have to go further than the United States. They will have to place themselves in the position not of imitators but of originators. They will have to indicate that they are not following the American system but that they are doing something on their own.* That is the question that is now facing the British Boxer Indemnity Commission.

The British Boxer Indemnity Commission consists of eleven persons, six of whom are now in China. Of these six, three are British, Lord Willingdon, Professor Soothill and Dame Adelaide Anderson; three are Chinese, Professor Hu Shih, Dr. V. K. Ting and Dr. C. C. Wang. Of the three British members in China, Lord Willingdon has held important administrative positions under the British Crown; Professor Soothill is an educator and scholar of high repute; and Dame Adelaide is a social worker and expert on labor conditions, who has previously visited China. The Chinese members are well-known in their own country: Dr. Hu Shih is the founder of the Rennaisance movement and is a brilliant Chinese educator, Dr. V. K. Ting is the founder of the Geological Survey of China and is a practical miner, Dr. Wang is one of the leading railway men of China.

The bill authorizing the remission of the indemnity and the appointment of the commission does not bind Great Britain to expend this money for educational purposes although, it does state that the money has to be spent "for such educational or other purposes which are in the opinion of the Secretary of State for Foreign Affairs, beneficial to the mutual interests of his Majesty and the Republic of China." The total amount of the British indemnity is £7,593,080.19 which is a much larger amount than the American indemnity.

How Shall the Money be Spent ?

Although the British Commission has not had time to determine their policy, a large number of suggestions have been made by interested parties. Among the suggestions are for the fund for educational purposes in Great Britain, in China and in schools to be established, or in universities already existing in China. One plan calls for the expenditure on graduate scientific schools and research laboratories. The medical profession of China has gone on record as recommending that the money be used for public health purposes in China. A large element among the Chinese people believe that the money should spent for the building of railroads or the re-equipment of existing lines which have practically been destroyed because of the rapacity of the of the Tuchuns who have used the railroads as though they were their private motor cars to be employed and destroyed at will. One suggestion has been made that the money be returned unconditionally to China, as the only method of winning the good will of the Chinese people.

One thing is certain, and that is, that the entire fund cannot be expended at once, and it is not to the interest of the Chinese that it be expended at once. The £7,000,000 will have to be made to cover a long period of time if any advantage is to accrue to the Chinese people. The commission will then have to determine what share of the fund is to be utilized immediately and what share is to be invested so that the interest on the money will be used for educational purposes, public health or any other plan which may be acceptable.

A Safe Investment

If the Boxer Indemnity Commission determines to invest these funds in Chinese securities, they will find it no simple problem to find a safe and adequate security which will protect them and at the same time have no political strings attached to it. If on the other hand, they determine to invest these funds in British securities, then there will be an out-cry in China against the British method and the commission will defeat its own purposes. A form of investment must be found then, which will at the same time safeguard the funds, satisfy British public opinion and not antagonize Chinese public opinion. We have maintained since 1923 that the only form of investment of this money which can provide dividends to all parties concerned and which will be of greater benefit directly and indirectly to the Chinese people than foreign controlled educational institutions, namely ; the building, equiping and re-equiping of railroads in China.

Wu Pei-fu and the Indemnity

In the *Far Eastern Review* for October, 1924 we published Marshall Wu Pei-fu's views on the subject, which are as true to-day as they were then. We stated :

> General Wu's plan to allocate the Boxer indemnity funds for railway construction and employ the revenues from these railways for the maintenance of schools is eminently sound, and should merit the support of every foreigner engaged in business in this country. The fact that not one foreign commercial body, chamber of commerce or other organization has come out in defense of their own interests by passing resolutions in support of General Wu's program, is a clear indication of the hold the educational and philanthropic interests have on the foreign community and their organs of public opinon. Wu's views on this subject are worth repeating. He invites attention to the basic truth that the indemnity is contributed by all classes throughout the country. The Tsing Hua College, supported by part of the indemnity funds returned by America, has been instrumental in educating a good many useful sons of China who are rendering good service. In spite of its usefulness General Wu says that in the main only sons of officials, or men of influence, had been admitted and that among students of the same standing and class seeking admittance with a view of gaining higher education in America, the sons of officials and men of influence have better chances. This, the Marshal said, was wrong, as many of the poorer class have had no hope of ever enjoying the privilege.
>
> On the other hand, if hard and fast rules are laid down for the revenues from the railways to be applied for educational purposes, it means that as long as these railways are in operation, there will be funds to educate the masses.
>
> "I am in favor of establishing as many schools in the interior as the revenues from the railways permit," the Marshal continued, "so that the poorest can be benefited. The rich can look after the education of their children, but the poor cannot. The greater portion of the Boxer indemnity is from the poor classes. Not only this, but the railways thus constructed will open the country, and benefit the masses. If my views are followed, it means that the well-to-do class will have a chance of acquiring a better education abroad, while the poorer class will at least have a preliminary education at home which will make them better Chinese citizens and more competent to have a voice in their own government."

Marshal Wu's suggestions provide a practical method of the expenditure of the fund, build railroads and utilize the profits for educational purposes. China's most crying need, from the economic, political and social standpoint, are ample means of communication, railroads, roads and highways of every type. At the present moment there are practically no means of communication between North China and other parts of the country except by foreign-owned coastal liners. The railroads have ceased to function and it is doubtful if the Peking-Mukden line, the Peking-Hankow and the Tientsin-Pukow line will ever be able to function properly again, unless they are completely rehabilitated. The Shantung Railway has been abused. All these roads require huge expenditures to make them efficient and the Boxer Indemnity offers a fund for that purpose with the added advantage that money used in this way is not spent but is invested and is bound eventually to bring a substantial return. Why should not such an investment be made ? Why should not the money serve this double purpose—railroad and education—China's Greatest Need !

That Inhuman Immigration Law

PERHAPS no phase of the American Immigration Law is as barbarous as that which makes it impossible for the wife of an American citizen to enjoy the nationality of her husband if she be of Asiatic birth. As the law stands, Chinese, Japanese and Hindu wives of American citizens are classed as aliens, ineligible to citizenship and are admissible to the United States only as immigrants returning from a temporary visit abroad, as ministers, professors or students. Asiatic wives of American citizens may also be admitted to the United States under the non-immigrant class, but considerable difficulty is experienced with the American authorities in making suitable arrangements. French and British wives of Americans may be included as non-quota immigrants if their husbands have filed petitions requesting such procedure. When they are admitted, these alien wives of American citizens may reside in the United States with their husbands indefinitely. At present, Asiatic wives of American citizens, are not entitled to this privilege. They are practically excluded from the United States except as immigrants.

Congressman Dyer of Missouri who has for some years been acting voluntarily as the representative in Congress for American citizens in China, has introduced a bill (H.B. 6544) which has for its object, to include Asiatic wives of American citizens in the non-quota class, which would give them the privilege of being admitted to the United States and to live there indefinitely with their husbands so request.

Mr. Dyer's bill is a most humane measure, as it is undoubtedly against all moral law that husbands and wives should be separated and families torn asunder when, as a matter of fact there has been peace and happiness in the household. It is against all reason and morals that a legal onus should be placed upon all Americans in the Far East who marry Asiatic women or that these women should suffer because they have plighted their troth to an American citizen. The fact that because of such marriages, the women become altogether without any nationality, is in itself an act of inhumanity which is bringing to the United States a great measure of antagonism among Asiatic peoples.

That the American government, through its immigration laws, definitely and unmistakably characterizes the Asiatic peoples as inferior to the white races, in spite of their longer cultural history and their fine civilizations, is a matter which will one day require revision if Asia is not to retaliate.

The importance of Congressman Dyer's bill lies not only in its humane effect on the individuals who benefit by it but in its impression upon the Asiatic peoples that not all Americans are so pledged to the Teutonic ideal of the tremendous superiority of the Nordic peoples, that they permit a major form of conceit to overawe their instincts of humanity and their conception of international justice and sound political common sense. If the bill is passed as it should be, the Asiatic peoples will have one cause less for antagonism toward their white brothers who so invariably speak of friendship and so seldom act up to their protestations.

One Solution

There is only one equable and satisfactory solution to the American Immigration Law and that is that no distinction he made between European peoples and Asiatic peoples. For when one considers the facts in the light of history, how much of Europe is inhabited by the white races ? Are not most Europeans in reality Eurasian with a very marked dominance of Asiatic stock ? The protagonists of the superiority of the Nordics seem altogether to have forgotten that the Huns, who started from north-western China, crossed the Rhone and in due course occupied a large part of western Europe. They forget that the Scythians came from north-western China and conquered large areas of south-eastern Europe and that the Mongols conquered eastern Europe after their march westward from their homeland in the region of lake Baikal. A scientific article on the invasion, conquest and assimilation of Asiatic peoples is not in place in this publication, but the facts of the situation are obvious and it is, therefore, little short of presumption on the part of most European nations and surely of the American people to suggest that they are altogether without an Asiatic factor in their racial heredity.

It would appear, however, that the antagonism of the American people is directed not towards all Asiatics but is limited to the Chinese, Japanese, Hindus and related peoples centering about the Pacific coast of the Asiatic continent. It is difficult to understand why this exception should be made. In this the American government appears definitely to place itself on record as maintaining that the people of these countries are racially inferior to all other human beings on the face of the earth. It is unbelievable that the American government has any such opinion. In fact, official Americans in their speeches and statements in the Far East are constantly praising the Japanese and Chinese people and at the Versailles and Washington Conferences, the American government recognized Japan not only as an equal in the family of nations but as one of the five principal nations in the modern world. The present conferences which taking place in China have for their purpose the recognition of the equality of the Chinese among the family of nations.

We must then infer that the umbrageous position in which the Oriental peoples have been placed by the American Immigration Law, is more a matter of accident than intention and it is, therefore, to be hoped that the Dyer Bill will be passed, that this error of enactment might be corrected and a cause for controversy and disturbance of cordial relations between the United States and the Asiatic countries may be removed.

* * *

Gary Says Japan Got Bessemer Rails

Those Criticized were made in 1907 or Earlier, He Explains—Process Since Abandoned

E. H. Gary, President of the American Iron and Steel Institute, issued the following statement in New York on February 3 :—

" Notwithstanding that the recently published report from Tokyo, criticizing the quality of American rails, has been materially modified, if not contradicted in substance, by a high official of the Japanese Government Railways, it is deemed appropriate by American manufacturers to make some observation concerning the subject matter.

" The reports referred to related and were confined to certain rails made from Bessemer steel which were supplied eighteen or twenty years ago, when the Bessemer process was practically universal both in the United States and Europe. It is believed no complaints have been made at any time regarding the quality of American Open Hearth rails, which have been furnished since the Bessemer process was abandoned for use in making rails.

" Moreover, the rails which were the subject of criticism, were manufactured in 1907 or earlier and weighed 60 pounds per yard. Increasing traffic and heavier rolling stock made it necessary to replace these rails with rails of heavier sections, and rails weighing 90 to 130 pounds per yard, or even more, are now very generally used on American railroads. A large rail order was received from Japan early this month for Open Hearth rails, and numerous other orders have been received during the past two years.

" Open Hearth rails of heavy weight, manufactured to specifications of recognized American engineering societies, have proved in actual use for many years in the United States and other countries to be superior to rails made by other processes. During the past two or three years more than half a million tons of American Open Hearth rails have been exported to foreign countries."

The report referred to by Judge Gary came from Tokyo last November, predicting that no more American rails would be imported by the Japanese Government Railways. This report was promptly withdrawn by the Railways Department.

We are informed that the United States Steel Products Company alone has supplied more than 1,000,000 tons of rails to Japanese Railways during the past thirty years, without complaint. No particulars have been supplied in this instance other than the rails in question were produced in 1907, and earlier, and are Bessemer steel.

There has been no complaint whatever regarding Open Hearth rails furnished by the United States Steel Products Company, which quality it has been their practice to supply for the past fifteen years.

They have been featuring Open Hearth steel, and as American Railroads demand Open Hearth the production of Bessemer rails is now less than one per cent in the United States. It is admitted by the Japanese Railway authorities that 60 lb. Section is too light for their present traffic, and the United States Steel Products Company, had during the past few years furnished 75 lb. A. S. C. E. and 90 lb. and 100 lb. A. R. A. Sections to Japanese Railways.

The Department of Commerce, Washington, received from the American Commercial Attache at Tokyo, under date of December 2nd, 1925, the following cable :—

> " S. GOTO Director Maintenance of Way and Construction Bureau, Japanese Government Railways, Categorically Denies that Railway Department has any Intention of Replacing Rails with German British Rails to the Exclusion of American Rails."

We are informed that the United States Steel Products Company recently received from Japan, for use on the South Manchuria Railway, an order covering 5,000 tons of 80 lb. Rails, and in January they received from the Hanshin Electric Railway of Japan and order for 5,000 tons. As recently as March 8th another order for 5,500 tons of 100 lb. Rails was awarded to the same Company by the Japanese Government Railways. All of these rails are to be manufactured of Open Hearth steel.

The records of the United States Steel Products Company show that Japan has not, within the past two years, imported customary annual tonnages. This is accounted for by the fact that the Japanese Steel Works are increasing their production and the low exchange value of the Yen made it necessary for Japan to restrict imports. This Company's rail sales to Japan during the past four years were as follows :—

1922	113,453 gross tons
1923	105,813 ,,
1924	30,405 ,,
1925	10,500 ,,

To indicate the extent to which Japan is becoming self-sustaining, the Managing Director of one of the important Japanese commercial firms of Tokyo stated recently that the Government Steel Works, under present program, would supply to the Japanese Government Railways during this year 150,000 tons of rails. He did not believe the Government Railways would import this year more than 50,000 tons of rails. It is understood that the Japanese Government is considering increasing import duty on rails from 15 to 20 per cent *ad valorem*.

* * *

The Currencies of China

AN INVESTIGATION OF GOLD AND SILVER TRANSACTIONS AFFECTING CHINA: WITH A CHAPTER ON COPPER: BY E. KANN: PUBLISHED BY KELLY & WALSH, LTD., SHANGHAI, 1926.

Under the above title a book has been issued recently which, by virtue of its contents, is not meant to cause sensation, but which nevertheless contains many revelations, even for the initiated reader. It is an indisputable and noteworthy fact that Mr. Kann's book stands in the front rank of scientific literature on so complex a subject as China. The currency question of that country has repeatedly formed the topic of many an essay, but the result has in nearly all cases remained an essay, a usually unsuccessful attempt. For the first time a work on the metallic currencies of China has been written which contains something of genuine interest to everybody trying to comprehend Chinese life. The historian will find interesting facts in the book; the numismatist will be enabled to learn much from systematically arranged information; the statistician will be delighted with the mass of carefully collected data usually inaccessible to the average person, and therefore, exceedingly difficult to present in an authoritative manner.

But all these creditable points are intended merely as a frame, the frame surrounding the picture which is represented by the valuable material constituting the practical side of the book. A mass of explanations on all aspects of Far Eastern arbitrage, of practical examples and, above all, of formulae showing the *raison d'etre* of the calculations with which the work abounds, give the book the stamp of authority and authenticity. In going through the contents the reader cannot fail to observe that Mr. Kann is treading on safe ground, that he avoids theories and that he is not content with merely presenting facts, but always ready to prove these.

"The Currencies of China" is divided into three sections treating the metallic currencies of the country, namely gold, silver and copper. The section on gold and gold transactions is entirely new to the mass of the people not directly involved in the difficult and often mysterious ways of Chinese finance. The complicated mechanism of gold bars and their intimate relation to international arbitrage transactions are for the first time divulged, and not only the general public, but also the Far Eastern banker will be able to learn and ponder over an interesting and important subject.

Most of the space is given to silver and silver transactions. This is natural, if one considers that for the liquidation of China's international commerce silver plays the foremost role. The chapter on "Taels" deserves special comment and praise. It is a masterly study on a most intricate subject, but all difficulties have been skillfully removed by Mr. Kann, who has succeeded in presenting to the world what is probably the most explicit and most exhaustive description that has ever been attempted. The history of the dollar in China has been given by the author in a manner which leaves nothing to be desired.

It needs no emphazising that the first edition of a voluminous work of a highly technical nature cannot be free from errors. But in the book under review these are unimportant and few. We venture the opinion that in consideration of its significance silver should occupy the opening chapters of the work, in place of gold. We also should like to suggest that an outturn of sycee shipped to outports ought to be included in the text, so as to provide a practical example.

Congratulations to the publishers, Messrs. Kelly & Walsh, Ltd., not only for having associated themselves with an author of Mr. E. Kann's standing, but also for the high standard of the work produced by them. It is no exaggeration to state that the printing and the general finish of the volume could not have been excelled anywhere in Europe or America. We understand that the sales locally of the book have been so satisfactory that four weeks after its appearance the question of a second edition has already become ripe for discussion.

J. H.

* * *

Engineering Training in India

THE changing conditions in the engineering trade in India are well told by "An Indian Engineer" in an article written for the London *Daily Telegraph*. In part he says:—

It is not so very long ago that the few engineering colleges and other engineering schools which then existed in India found it difficult to attract suitable candidates for training. The situation has now been completely reversed, there being a greater demand for places than the education authorities can cater for. This is a very good index of the increased industrial activity in a country whose interests are, of course, mainly agricultural.

These signs are looked upon with a certain amount of misgiving by many people in England, who consider that the value of India as a great market for British manufactured goods would be thus diminished. In point of fact, however, there is no need for anxiety on that account, because, even if the most sanguine hopes entertained regarding the expansion of the iron and steel and other industries were realized, India would only be able to supply a small portion of her enormous requirements, and this in the remote future. The immediate result of the industrial awakening is the active demand for machinery, prime movers and other plant from which British manufacturers more than any others are likely to derive considerable benefit.

Civil engineering in its broadest sense, covering structural, irrigation, sanitary, water supply, roadway and harbour engineering, naturally claims the largest number of young men aspiring to the profession of engineering. The scope of the mechanical engineer, and to an even more marked extent of the electrical engineer, is generally restricted to erection, maintenance and repair work. Actual production work is not large taken into consideration with the size of the country.

The Presidency cities are the centres of engineering as of other branches of higher education, but, curiously enough, what is recognized as the leading institution in the civil engineering line is at Rourke, a moderate sized town in the United Provinces. Originally intended as a recruiting ground for military engineers, it now supplies the greater part of the demand for engineers in the North Indian Public Works Departments. It has been the nursery in which some of the most eminent engineers of the Public Works Department have been trained, and constitutes a striking testimony to the good work of the Royal Engineers in India.

The engineering colleges at Guindy, near Madras, Poona (Bombay), and Sibpur, near Calcutta, are affiliated to their respective universities, as are also the comparatively new ones at Benares and Bangalore. In general, the duration of the course is four years, with a year spent in practical training, the last mentioned being a condition to qualify for a degree. The staffs of these institutions are recruited from experienced officers of the engineering services, and include both Britons and Indians.

Some details of one of these colleges, namely, the one at Guindy, near Madras, may prove of interest to engineers in general. Annually, between thirty and forty engineers complete their training here, and, of this number, more than one half take up civil, and the rest the mechanical and electrical branches respectively. The course at college extends over four years, and one year is spent on practical training. The college is housed in an imposing building standing in grounds which cover an area extending over 200 acres. Together with the students' hostels and residences for members of the staff, the institution forms a self-contained colony, with its own power and water supply and drainage systems. Separate laboratories, replete with thoroughly modern apparatus, are provided for science, testing of materials, hydraulic, electrical, and mechanical engineering. The machine shops are well laid out with various types of machine tools, electrically driven, partly on the individual and partly on the group system of drives. A small foundry and smithy are also provided. The power-house to which the senior students have access contains examples of all the different types of prime movers, and has both D.C. and A.C. distribution systems installed in it.

The provision of practical training in practical work in civil engineering branches presents no problem, as India is a country in which extensive civil engineering works are always in progress. The difficulties in providing similar facilities for mechanical and electrical engineering graduates has often been brought to the notice of the Government of India, but it is hard to see a way out of a problem created by lack of large and well-equipped engineering production works. At present, power station experience is often the only thing open to the young graduate, and this is, of course, rather unsatisfactory when compared with works training in up-to-date shops in England and America. Those of the students, who can afford it, seek practical training abroad and in this connection it may be mentioned that during recent years the number of young Indian engineers going over to the U. S. A. has been on the increase, owing, apparently to the greater willingness of American firms to provide the desired training. A number of progressive electrical and other works in this country have adopted a similar bold policy, and their experience tends to show that the training of overseas men reacts most favorably on their business with these countries, particularly where there is no possibility, as in the case of India, of such countries becoming rivals in the future.

* * *

A. Stuart Durrant New Vice-President of I.G.E.

Announcement has been made by the International General Electric Company that A. S. Durrant, formerly manager of the Department of the Americas, has been appointed Vice-President.

Mr. Durrant first entered the employ of the Company in the Construction Department of the Edison United Manufacturing Company, New York City, in May 1890. This Company was later merged into the General Electric Company.

From 1891 to 1896 Mr. Durrant was in the Engineering Department of the New York District Office, and was transferred to the Construction Department of the General Electric Company in Schenectady in May 1896, in charge of all railway work. In 1898 Mr. Durrant was transferred to the Foreign Department of the General Electric Company. From that time until 1908 he was in charge of all commercial work in the Foreign Department and from 1908 to 1913 Mr. Durrant gradually relinquished most of this work to devote himself to building up the business in Canada, and Latin America.

When the International General Electric Company was formed in January 1919, he became Manager of the Department of Americas, which post he held until now. James C. Ryan, formerly sales manager of the Department of the Far East, has been appointed General Sales Manager of the Company.

Mr. Ryan first entered the employ of the General Electric Company in the Testing Department, in August 1901. In December 1904 Mr. Ryan entered the Engineering Division of the Foreign Department. His work here was first associated with the South and Central American countries and later on with sales in the Far East territories. In 1910 Mr. Ryan was given charge of the Far East Section of the Foreign Department.

Upon the formation of the International General Electric Company in 1919, Mr. Ryan was appointed to the position of Sales Manager of the Far East Department. During the latter part of 1922 and early part of 1923 he traveled in Japan, China and the Philippines. Again in 1925 he spent six months in the Far East reviewing market conditions with the International General Electric Company's representatives there. He returned to the U.S.A. and has held the post of Sales Manager until now.

* * *

Recent Promotions in The Superheater Company

The Superheater Company of New York and Chicago recently elected Mr. M. Schiller, Vice-President in charge of Accounts and Purchases, and Mr. W. F. Jetter, Treasurer and Assistant Secretary. Mr. Bard Browne was appointed Assistant to Vice-President in Charge of Sales and Service, and Mr. T. F. Morris, Assistant Secretary and Assistant Treasurer.

All of these men have been long associated with The Superheater Company. Mr. Schiller joined the Company in 1910 when it was organized as the Locomotive Superheater Company, and has served in various administrative and executive capacities. Mr. Browne came with the Company in 1914 and has been actively identified in the application of locomotive superheaters and feedwater heating devices, serving in various engineering, sales and service capacities.

The Superheater Company are designing engineers and manufacturers of Elesco steam superheaters for locomotive, marine and stationary boilers, feedwater heaters and exhaust steam injectors for locomotives, pipe coils, etc. The Company is composed of engineers who have had long experience in the design and perfection of equipment for locomotive, and marine and stationary power plant services. They are the world's largest manufacturers of steam superheaters and have affiliations in Canada, England, France and Germany.

China a Growing Market for Iron and Steel

In recent years China has been consuming increasingly large amounts of foreign iron and steel despite unsettled political and economic conditions. Taking the average importation of the principal commodities for the last four pre-war years, approximately 182,700 gross tons per annum, and that for the latest four postwar years (1921 through 1924), approximately 323,500 tons per annum, an increased consumption of 77 per cent is noted. The products which show the greatest gains are bars, rails, tin plate, sheets and plates, pate cuttings, pipes and tubes, galvanized wire, and nails and rivets.

1924 Imports Show Large Increase—Comparison for Recent Years

A total of 547,706 tons of foreign-made iron and steel entered China in 1924, according to official trade statistics of the various Chinese ports. This compares with 347,064 tons in 1923, 375,500 tons in 1922, 292,701 tons in 1921, 397,350 tons in 1220, 345,780 tons in 1919, 261,252 tons in 1913, and 168,872 tons in 1912.

Details of the importation of iron and steel into China in the pre-war years 1913 and the past five years are presented in the following table :

Imports of iron and steel into China

Articles	1913	1920	1921	1922	1923	1924
Pig iron and kentledge	7,900	1,0975	2,196	4,900	3,960	6.260
Scrap and old steel ...	42,900	57,100	28,250	63,000	41,000	48,000
Iron and mild steel bars	35,400	80,000	41,700	55,900	69,300	115,300
Mild steel hoops ...	5,480	7,345	2,420	3,695	6,175	8,460
Galvanized sheets ...	13,500	15,750	9,100	19,300	18,700	19,600
Tin plate	21,640	36,050	24,800	15,800	31,100	53,600
Iron and mild steel sheets and plates ...	21,340	40,900	21,300	30,400	28,200	44,600
Plate cuttings ...	21,400	29,800	18,450	36,150	23,700	38,750
Angles and tees ...	(1)	9,600	6,850	7,120	8,240	13,850
I beams	(1)	1,460	2,940	3,660	3,565	4,950
Rails	17,850	18,480	64,200	43,850	23,300	55,500
Pipes and tubes ...	3,865	15,000	14,500	13,270	15,470	16,450
Wire shorts and cobbles	20,300	21,850	10,380	22,950	25,050	28,500
Plain wire	3,640	4,140	1,870	3,250	1,810	2,600
Galvanized wire ...	3,927	4,900	4,680	5,180	5,220	9,030

Imports of iron and steel into China

Articles	1913	1920	1921	1922	1923	1924
Nail rods	7,330	640	705	580	524	631
Nails and rivets ...	19,630	21,200	15,220	23,700	17,320	39,700
Bamboo steel bars, etc.	8,300	8,100	4,900	4,315	6,480	8,625
Miscellaneous ...	6,850	14,060	18,240	18,480	17,950	33,300
Total	261,252	397,350	292,701	375,500	347,064	547,706

1 Not shown separately.

American Share in Trade Declines

Statistics for the countries of origin of the 1924 imports have not yet been made available. The United States supplied 17.8 per cent of the Chinese receipts of the more important foreign iron and steel products during 1923. Although twice the weight of the American goods shipped to China in pre-war years, the share of the United States in the 1923 trade was proportionately about the same as in 1912 and about 6 per cent better than in 1913. In 1919 and 1920 American producers had led in the Chinese field, accounting for 45 per cent and 42 per cent, respectively, of the total importation. The proportion of takings of American iron and steel dropped to 40 per cent in 1921 and 30 per cent in 1922. In the four years immediately following the war the United States was first in the market, but before the war it had been surpassed by both the United Kingdom and Hongkong.

The proportion of the entire exportation of iron and steel from the United States in 1923 which went to China was 2.6 per cent or 52,327 gross tons. Statistics compiled by the United States customs offices show that in 1924 the shipments to China aggregated 57,126 gross tons, or 3.1 per cent of the total export trade of the year.

Belgian and British Goods Now Outrank American Products

In 1923, Belgium as well as the United Kingdom exceeded the United States in the sale of iron and steel to China, Belgian contributions amounting to nearly 20 per cent of the entire importation. Hongkong with 13 per cent, Japan with nearly 10 per cent, and Germany with nearly 7 per cent were the next largest sources of supply.

By 1922 Belgian competition had become formidable, and now has regained its commanding position in the Chinese importation of iron and mild-steel bars; in 1923 Belgium supplied nearly one-half of the entire receipts. Between one-fifth and one-sixth of the imports were credited to Hongkong. The United States was next in order, and considerable tonnages were received from Japan, the United Kingdom, and Germany.

British Control Hoop Trade—United States Leads in Rails

Over two-thirds of the 1923 trade in mild-steel hoops was conducted by British exporters. The United States has been losing ground in this particular line, the 1923 shipments having amounted to only 411 tons, which is slightly under the pre-war level. In 1919, 1920, and 1921 American concerns accounted for an average of 1,800 tons per annum.

The United States has been preeminent in the trade in steel rails, exporting to China 13,270 tons in 1923, 20,100 tons in 1922, 50,550 tons in 1921, 7,610 tons in 1920, 43,500 tons in 1919, 7,165 tons in 1913, but only 6 tons in 1912. With the exception of 1912, the American product was far in advance of other competitors; in 1912 Russia led in the trade.

Bulk of Sheets and Plates Supplied by the United Kingdom

More than one-half of the tin plates imported into China in 1923 were of British manufacture and about one-fourth were from the United States. The major part of the remaining shipments were through Hongkong. The United Kingdom also accounted for one-half of the Chinese takings of plate cuttings, one-fourth of which was credited to Hongkong and the other fourth was divided among several countries. The United States was the outstanding source of plate cuttings in 1922 and also in 1920.

The United Kingdom supplied over two-thirds of the galvanized sheets received in China in 1923, or 13,400 tons. Japan and the United States divided the bulk of the remainedr.

The United Kingdom and Belgium were the chief contestants for the business in iron and mild steel sheets and plates, the former having shipped 7,500 tons and the latter 7,940 tons in 1923. Japan with 4,660 tons, Germany with 3,515 tons, Hongkong with 3,015 tons, and the United States with 1,014 tons, accounted for nearly all of the remaining tonnage. British merchants have been consistent for a number of years in keeping about one-fourth of the Chinese trade in these sheets and plates. On the other hand, the American product has not maintained its position; in 1919 and 1920 the United States was the leading supplier.

U.S. Gaining in Pipe and Tube Trade

Of 15,470 tons of pipes and tubes imported into China in 1923, 5,170 tons came from Japan, 4,720 tons from the United States, and 4,175 tons from the United Kingdom. The position of the United States with reference to this product has been much improved, compared with pre-war years. Belgian producers, who had accounted for fairly heavy tonnages in 1921 and 1922, shipped only 612 tons in 1923.

In the early postwar years Japan, the United States, the United Kingdom, and Canada were the leading sources of the Chinese imports of angles, tees, and joists. Recently Belgium has occupied first place in this trade.

Sources of Wire and Nails

Nearly one-half of the 1923 imports of wire shorts and cobbles came from the United Kingdom. The United States, Belgium, and Germany accounted for most of the remainder. Germany, Hongkong, Japan, the United Kingdom, Belgium, and the United States were all important sources of the galvanized and plain wire imports in 1923.

Germany, Belgium, and the United States each accounted for more than one-fifth of the Chinese imports of nails and rivets during 1923. Hongkong was next important, followed at a considerable distance by the United Kingdom and Japan.

Much of the pig iron and kentledge received in China came from Japan, which furnished 1,148 tons in 1923. The United Kingdom was the next largest supplier for that year, and Hongkong, Korea, and Russia were also prominent in the trade.

Improvement of Cotton Plantation in Nanking

With public and official support, the Agricultural Department of the Southeastern University, Nanking, was able in the year 1921 to establish cotton experiment stations in Kiangning, Kiangpu and Shanghai, in Kiangsu province, Wuchang and Hankow, in Hupeh province, Chengchow in Honan province and other places, covering a total area of 1,600 *mow*, and placed in charge of four experts. Steps were taken to improve Chinese cotton as well as to "domesticate" American cotton. The past five years' work has produced the following results: (1) Domestication of American cotton. Three kinds of cotton namely, Trice cotton, Alaca cotton and "University No. 1" cotton have been made adaptable to Chinese soil. Every *mow* of land planted now produces 79 catties of cotton, which is 29 catties more than the average yield of the other varieties, and brings an additional profit of $4.70 to the farmer according to the present market price. (2) Improvement of Chinese Cotton. Up to the present, three kinds of native cotton have been improved, viz., "green-stalk and chicken-foot" cotton, Kiangyin white-seed cotton and Hsiaokan long-staple cotton, which show even better results than American cotton both in quality and quantity. The Kiangyin white-seed cotton, for instance, produces 90 catties per *mow*, or about 40 catties more than the average production of the ordinary crop, and nets the farmer an additional profit of $6.40 according to current prices. These stations distribute cotton seeds to the farmers every year and appoint experts to advise them on new methods of seed selection and cultivation. In 1925, 370 *tau* of cotton seeds were distributed to 1,100 farmers and planted on 5,600 *mow* of land. On the basis of 31,600,000 *mow* of cotton land in China, an average increased profit of $3 per *mow* would mean additional revenue of more than $90,000,000 to China's national wealth every year. In Kiangsu alone, the area of cotton land exceeds 12,000,000 *mow*. By applying similar methods of improvement, an additional annual income of $36,000,000 would be secured to the province.

Electrical Developments in Japan

By George Scott, A.M.C.T.

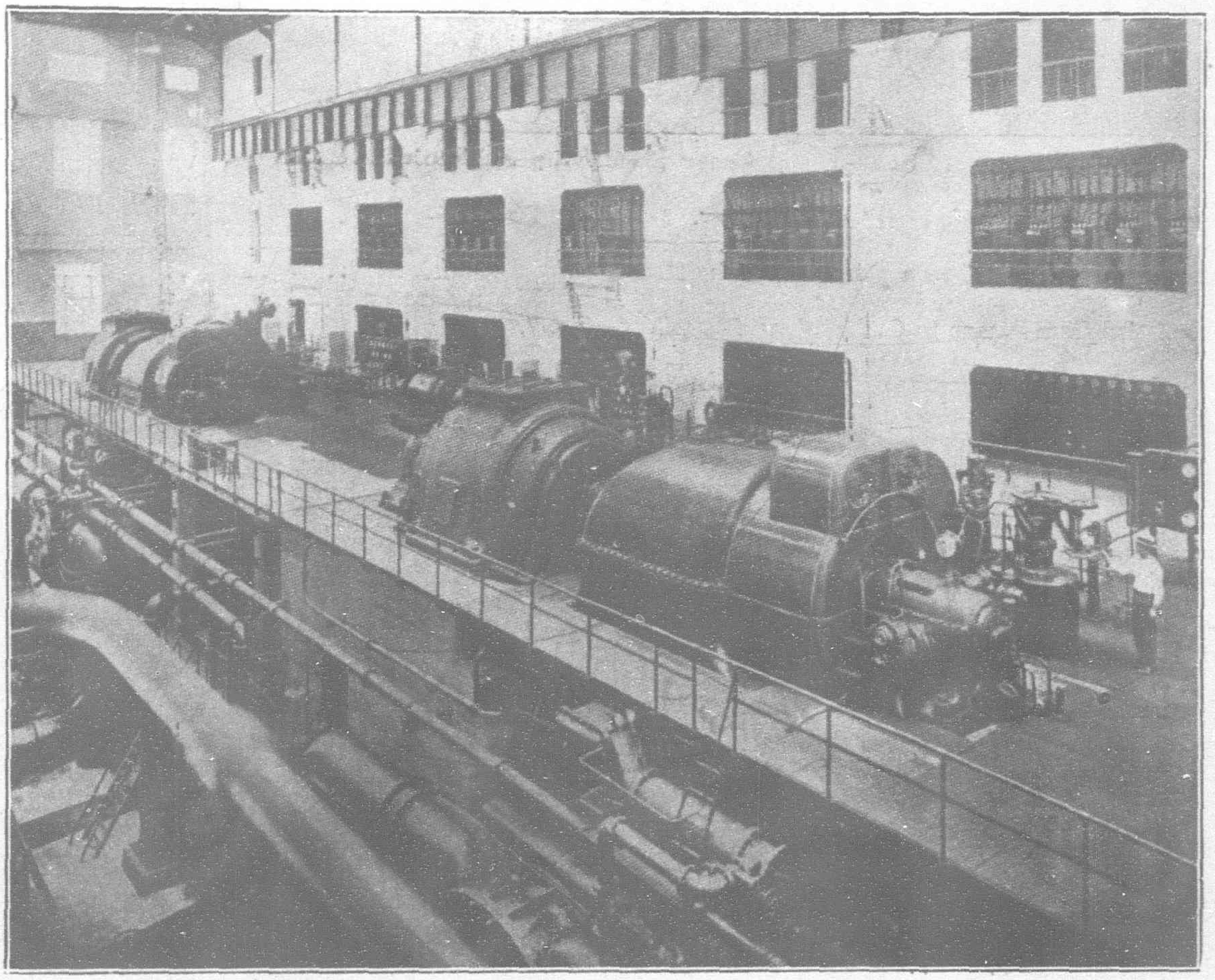
THE Western mind conceives Japan to be a country a long way off, populated by people of small stature and strange customs, a land of flowers and sunshine, chiefly noted for the possession of an enormous mountain named Fujiyama, a bad reputation for earthquakes, a desirable place to visit; but beyond this, little is intimately understood of the country, or its development since the foreigner was allowed to enter freely into the country, nor is it generally understood how rapidly its people have developed the best of occidental ideas. With extraordinary native genius and adaptability they are fast changing the customs, life, and mode of the country from the exclusive and isolated nature of the older oriental order to one having all the charm of the east with the advanced ideas of the west.

The advent of the steam engine, the steam locomotive, and steamship, marked an epoch in the life of England, bringing innumerable advantages, among which are sea power, land power, and a foremost place among the nations. The vigorous exploitation of her coal reserves, development of transport, manufacturing activity, accomplished thereby was made possible by these early engineering achievements and enabled the country to compete and secure a large share in the markets of the world.

The advent of the development of electrical reserves in Japan will assuredly be as epoch making. This development is already sufficiently phenomenal to deserve the careful study of those professionally interested as well as those who admire engineering achievement.

The Japanese nation has for the last decade been harnessing her water reserves, and with courage, enterprise, and skill, developed in a remarkably short time a tremendous power for industrial and other purposes.

This article will deal with the development of the electrical industry as it has been accomplished by one of the leading and most enterprising power supply companies, namely, Nippon Denryoku Kabushiki Kaisha (i.e., Japan Electric Power Co., Limited). When it is realised that several such companies are operating it will be agreed that the electrical development of Japan has made very rapid strides within the last few years, and in many respects this development is equal to that of the most advanced nations



The Engine Room at the Amagasaki Steam Power Station, showing the two Metropolitan-Vickers 25,000 k.w. Turbo-Alternators

The obstacles of nature already overcome, the natural difficulties, call for qualities and patience worthy of the best engineering traditions throughout the world.

The Company was formed (licensed) in October, 1919, to exploit rivers and supply power to certain prefectures. The general scheme of things built and contemplated will be seen by reference to the map. (Fig. 1).

The initial capital of the company was Y.50,000,000. At par value, this is equal to £5,000,000 sterling.

The demand for power is very great. The Company is still extending its activities; at the present time the capital is Y.60,000,000, and a bond issue of Y.38,000,000, in all Y.98,000,000, equal at par value £9,800,000 sterling.

At the present time the company has completed hydraulic installations aggregating about 100,000 k.w., and steam installations aggregating 50,000 k.w. Development is proceeding at a rapid pace, and it is anticipated that within ten years the Company will have installed plant of 750,000 k.w. capacity, say the equivalent of ten English super power stations like Barton, Manchester, at the rate of one per annum. The first section of the development was the construction of a transmission line from Sasazu to Osaka. A study of the map (Fig. 1) will show that this line connects the Pacific Ocean side of Japan with the Japan Sea. Water power developed by the rivers in the mountainous districts on the far side of the country converted to electrical energy is carried by the transmission line and thereby made available right across the country for the industrial areas and large towns such as Kobe, Osaka, Kyoto, Nagoya, etc., nearly 200 miles distant.

It will be seen that there are many rivers in the region near the Japan Sea and Japanese Alps. A large number of hydro-electric stations will be built in this region. Power will be transmitted from Kurobe to Tokyo, a distance of 170 miles. Thus the Company have license to supply the two most important areas of Japan each about 200 miles from the source of supply.

Japan thus realises the ideal of generating at the source of supply (the river) much more nearly than is possible in other countries where it is rare indeed, that the necessary coal can be obtained at a place where circulating water is plentiful. Many of the rivers are in the region of the Alps and have a constant supply

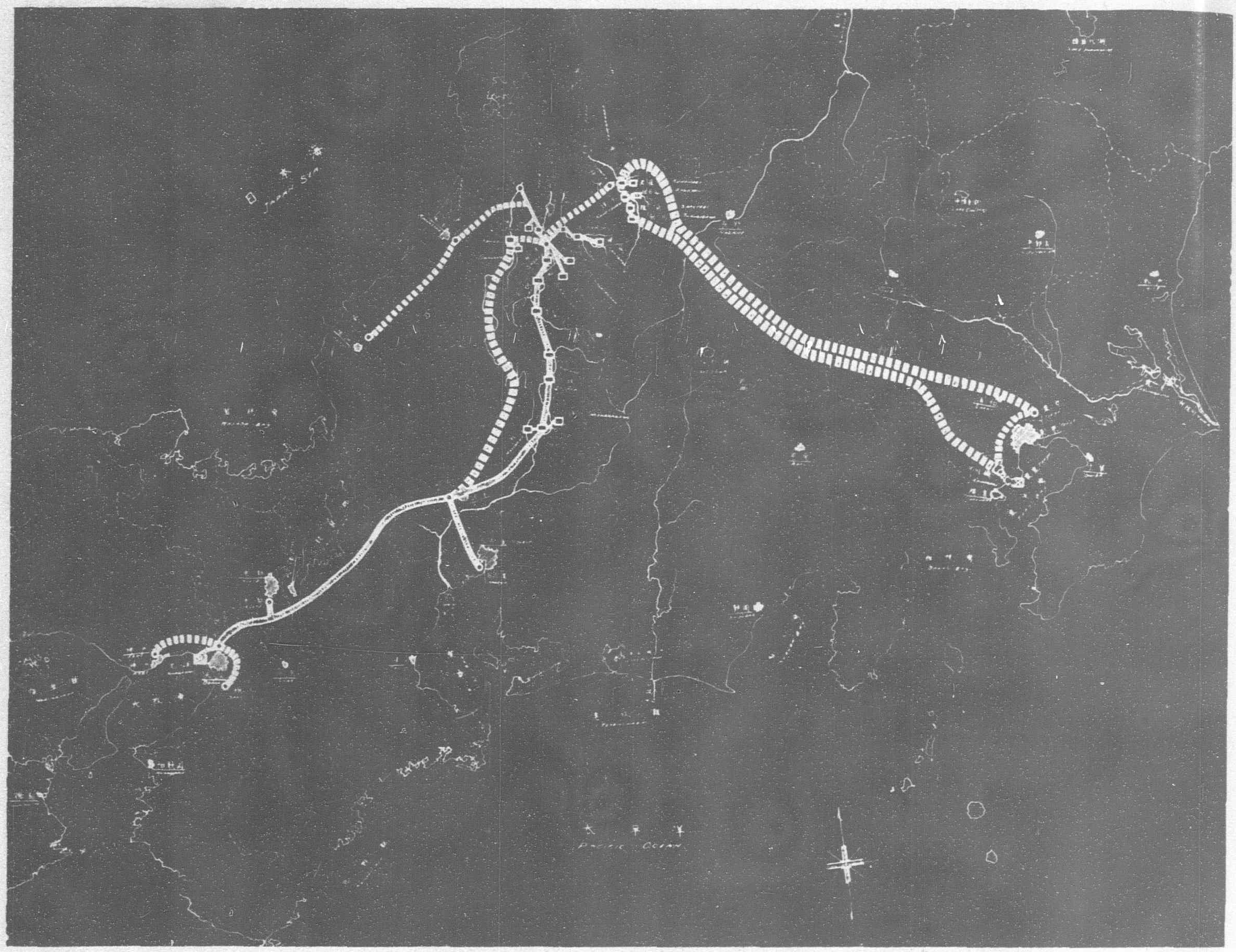


Fig. 1.—Map of the System of the Nippon Electric Power Co.

of water all year round due to being fed with melted snow.

Besides these main lines there are other transmission lines shown dotted under construction; they vary in length from 20 to 100 miles.

Main line transmission from Sasazu to Osaka, about 200 miles, is at 154,000 volts.

Ogaki to Osaka, 86 miles, and many smaller sections, about 20 miles, are at 77,000 volts.

The Osaka-Sasazu line will be interconnected by a transmission line from Sasazu to Kurobe, about 30 miles long, at 154,000 volts.

The contemplated line from Kurobe to Tokyo, about 170 miles, will have transmission voltage 220,000.

As a concrete example for the technical interest of transmission line engineers a few details of the main line are given :—

Main Line.—Osaka to Sasazu, refer map (fig. 1).

Total length	200 miles
Voltage	154,000 k.w.
Power Transmitted	125,000 k.w.
Cycles	60
Phase	3
Circuits	2

Conductors.

Level Land (copper)	350,000 circular miles.
Mountainous Districts (aluminium)	400,000 ,, ,,

Spans.

Standard span for copper.. ..	750 feet
Standard span for aluminium ..	900 feet.
Longest ,, ,, ,, ..	3,700 feet.

Towers.—

Highest	190 feet.
Standard	82 feet.

The nature and difficulty of the mountainous regions from Fig. 7.

This section of transmission line was constructed in about two years.

The complete equipment of a hydro-electric system on modern lines and of large capacity, calls for the highest engineering skill in every branch of the art, besides infinite patience before work is undertaken, in the survey, tabulation, and recording of the flow of the rivers, rainfall, flood, levels, etc. The observation work must often be systematically studied for several years. Thus civil, constructional, electrical, mechanical, engineering skill of the highest order is required, and even after the utmost care has been exercised, it must be remembered that the forces of nature cannot be entirely foreseen or estimated. For example; an extraordinary flood may carry away part of the structure in the river, a heavy snow storm or lightning attack will incapacitate the transmission line. In addition to these normal abnormalities in Japan there are the disturbing effects of typhoons and earthquakes to be added to the tale of possible troubles. All the above are additional to the ordinary run of troubles well known to power house engineers.

Two hundred miles of transmission lines with the receiving stations, distributing stations and switching stations cost Y.20,000,000, i.e. at par value £2,000,000, say £10,000 per mile.

The transmission line alone for 154,000 volt cost Y.12,000,000 (£1,200,000), at an average of Y.60,000 (£6,000) per mile. This price was considered to be about 10 per cent. cheaper than normal construction price.

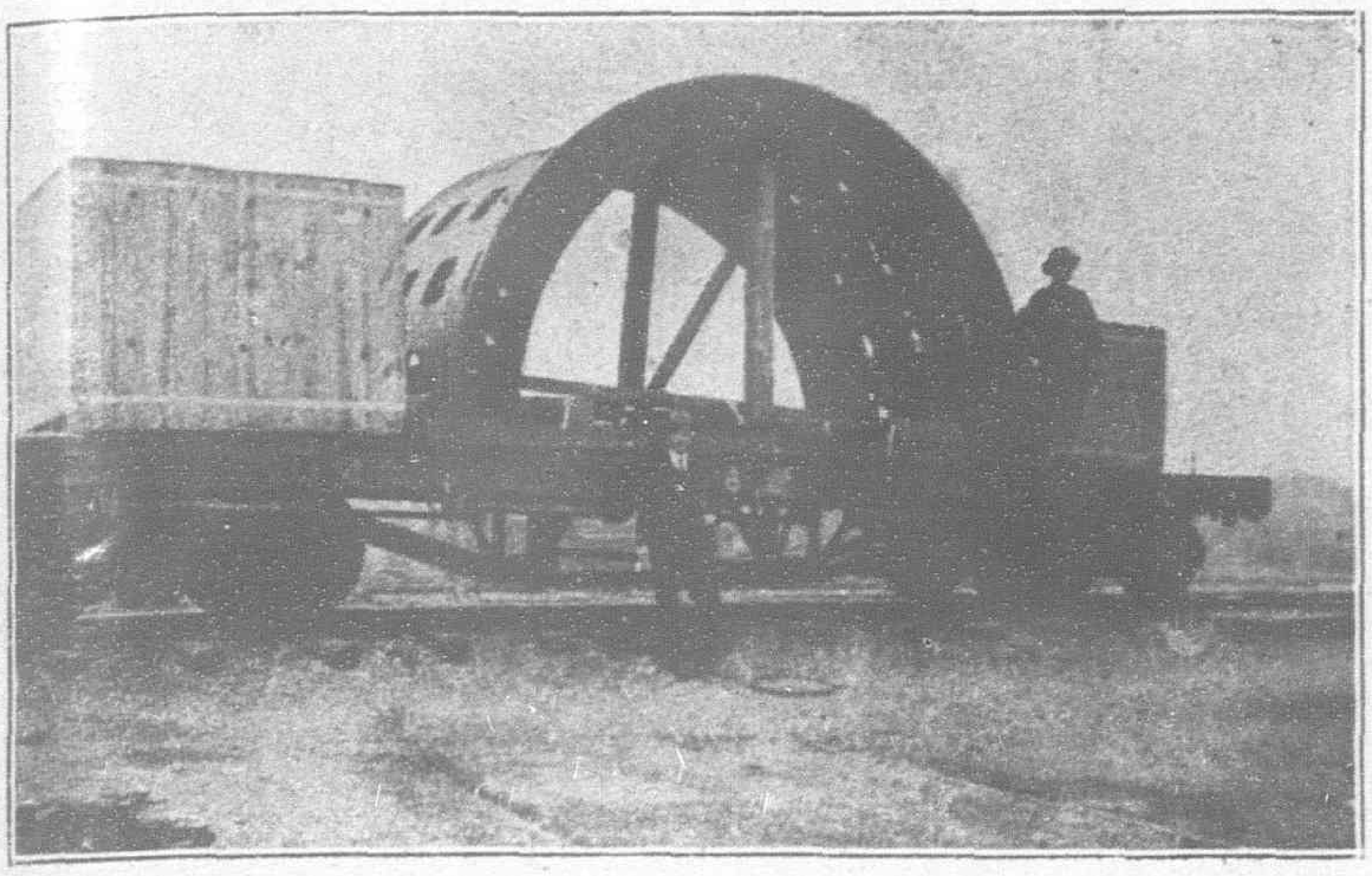


Fig. 2.—Generator Frame ready for Transport

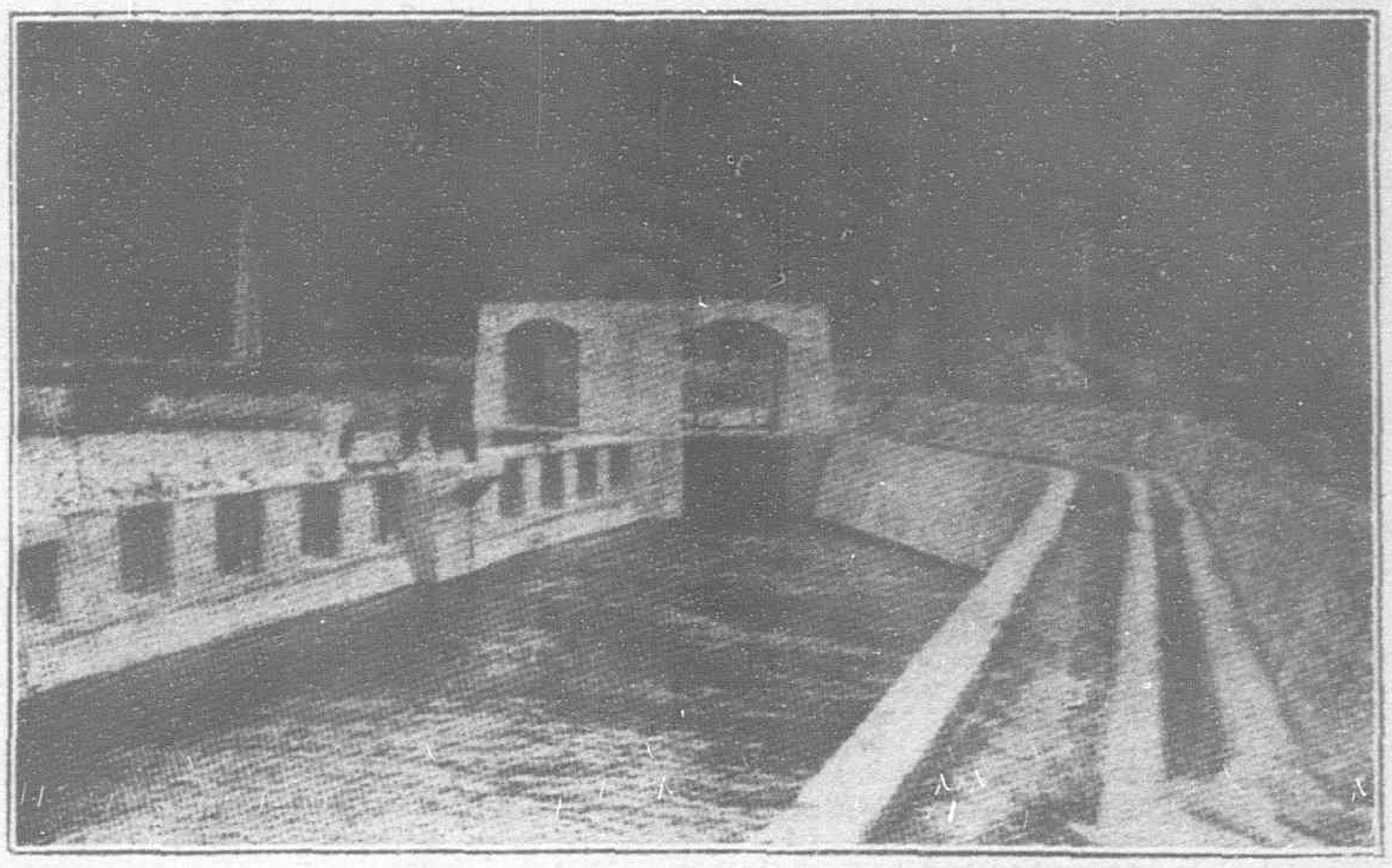


Fig. 3.—Gate and Second Sand Settling Pond at Utsubo for Kanideta Station

A description of one of the latest hydro-electric stations recently put into commission by the Company will serve to illustrate the general character and features of these stations.

Kanidera Power Station.

Total capacity		50,000 k.w.
Number of units		2 by 25,000 k.w.
Water Quantity		1,600 cubic feet sec.
Head		444 feet
Penstock,	largest dia.	11 feet
	smallest ,,	$8\frac{1}{2}$ feet
	thickness,	0.8 inch.

The usual practice is to divert water several miles upstream, in this case 7 miles, give a head 444 feet. There is no dam, an intake is constructed. From this point, the water is conducted through a special canal to the penstock and finally to the waterwheel. The canal usually has one or more sand settling ponds, which shows the main water intake, and first settling pond for Kanidera. The entrance to the second sand settling tank is shown in Fig. 3, at the outlet of which the water enters a tunnel about 7 miles long, driven through the hills.

The main water intake and first sand settling pond under construction is in a way very similar to the construction and has the appearance of locks on our main canals. It is usually performed in a region miles from supplies.

Seen in the photos of finished construction it all semes very easy but in order to make these things possible many tons of material must be brought to position. In many cases the railways terminate 20 miles from the power house site, transport of varying and unique types must be pressed into the service.

For Kanidera Station, 150,000 barrels of cement and other constructional materials in packages under 500 lbs. weight were transported by aerial ropeway. There is no trace of a road in this region (see Fig. 8). The length of this ropeway is 12 miles and its cost about Y.500,000 say £50,000.

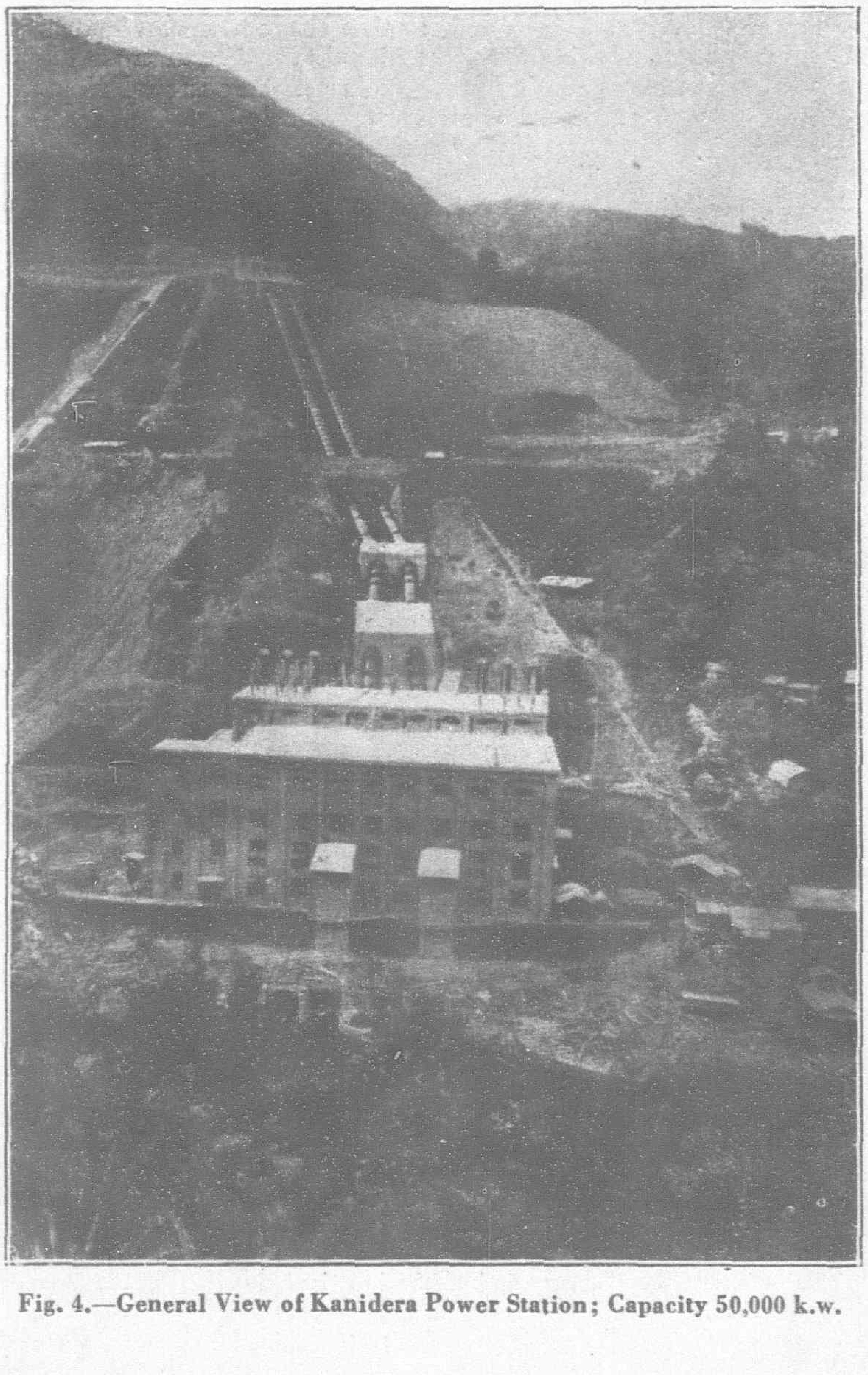


Fig. 4.—General View of Kanidera Power Station; Capacity 50,000 k.w.

Large machine parts weighing over 15 tons were transported over the mountain road by caterpillar tractors.

Fig. 10 shows transportation of oil switch tank on an improvised well centre truck, ingeniously fashioned from two country cars with long cross poles.

Fig. 2, part of generator frame at railhead ready for transportation. Existing bridges are always quite inadequate to handle the heavy loads and it is necessary to construct bridges for this purpose.

Local labour and local transport benefit greatly by the activity of the " Kaisha " or company as they term it.

The final result of months of incessant toiling and previous years of unseen scheming is seen in Fig. 4, this shows general view of Kanidera Power Station completed. It is impossible to describe all the busy activity attendant upon such enterprise, in many cases the hills are so steep that special roadways must be constructed.

The complete power station thus described cost Y.18,000,000 at par value, £1,800,000, including interest and all other indirect expenses. This equals about Y.360 per kilowatt or £36 per kilowatt for the complete equipment from water intake on the river to water outlet from the station.

In additon to the foregoing a hydro-electric system requires switching stations, substations, etc.

The river water supply is, of course, a variable factor. Japan has two dry seasons, first, January to March, of about eight weeks; second, August to September, of about four or five weeks, during these seasons it is impossible to supply the whole of the plant with water and consequently a proportion of it becomes idle.

The proportion of plant shut down during dry seasons depends on the duration of dry season and the nature of the rivers, although observations covering a period of years may have been made, the matter is in the hands of nature and a prolonged drought may upset the most careful foresight. The general basis being that in the dry season one half of the station capacity will be available.

To provide against this difficulty as far as possible and maintain a reliable power supply, it is necessary to have stand-by steam stations so that when the water power fails, full supply to customers can be made up by generating with steam.

The Nippon Denryoku Company have dealt with this question with characteristic thoroughness.

A reference to the map (Fig. 1) will show that on the Pacific coast the transmission line terminates at two points which are in close proximity to the sea.

At these points there is a good supply of circulating water from the sea, coal is brought by special sailing vessels from Kyushu; they are thus ideally placed for steam generation.

The transmission lines are thus fed at the most favourable points, for water power in the river districts, and steam power at the coast.

Two stand-by steam stations are being established one at Tsurumi and one at Amagasaki, these stations are equipped on the very latest lines and compare favourably with our super-power stations as to actual equipment, capacity of generating units, and running performance.

When completed, Amagasaki will have a generating capacity of 140,000 k.w. At the present time the station is completely equipped for 50,000 k.w. The particulars of this station are summarised below.

The above represents the station equipment at present, but extensions are well advanced, and during the next twelve months two additional 25,000 k.w. sets and one 40,000 k.w. Metro-Vickers Turbo-Alternator Sets will be put in commission bringing up the total capacity of this station to 140,000 k.w.

This station was designed in 1922, and Mr. Fukunaka (engineering director) embodied all the most modern features of steam power house design which had been proved efficient and reliable at that time in other parts of the world. Thus 50 per cent. of the boiler plant is equipped for pulverised coal. Multi-stage, feed water heating is adopted by two stage tapping from the main turbine and from the glands and air ejectors.

Make-up feed water is treated in an evaporator working automatically between the main feed water heaters, ensuring maximum efficiency of operation under all conditions, the system is entirely closed from air.

The alternators are cooled by air passing in continuous circulation through patent coolers in the foundations in a closed system.

All important auxiliaries have a duplicate supply of current from a house turbo-alternator set.

Central control of boiler firing is adopted.

The constructional and building work constitutes a record in Japanese building.

The first pile was driven in the ground in the autumn of 1923, and the first kilowatt generated in December, 1924.

When the size of the undertaking is considered, this is a building achievement quite equal to the best in western countries.

This station cost about Y.9,200,000, that is at par value £920,000, for the complete installation of 50,000 k.w. This is about Y.184 (£18 8s.) per k.w. complete from water inlet to outgoing transmission line.

Detail features of the station will be gathered from the following illustrations :—

Fig. 5.—Shows arrangement plan and elevation of coal storage and method of coal handling. The river shown supplies condensing water which is discharged into another river located to left.

Fig. 6.—Cross section through the whole of plant shows complete layout from coal intake to transmission line en route to substation.

The station tests results show about 17,000 B.T.U. per k.w. hour. For short test periods this represents a thermal efficiency of 20%, which will be recognised as equal to the most modern stations, and is largely attributable to the adoption of feed heating, pulverised coal, etc.

The steam station at Tsurumi will have as a first instalment two 35,000 k.w. Tandem Turbo Alternator Sets. The station will in most respects be similar to the Amagasaki Plant described above except that it will operate with higher steam conditions to obtain the thermal benefits of an extended heat cycle. Additional feed water heating will be adopted and air pre-heaters will be installed so that the station can be operated with the full extent of efficiency to be obtained from these improvements.

It will be observed from Fig. 1 that the system supplies two areas, namely, the Osaka area and the Tokyo area. The Osaka area has a frequency of 60 cycles and that of Tokyo 50 cycles. In

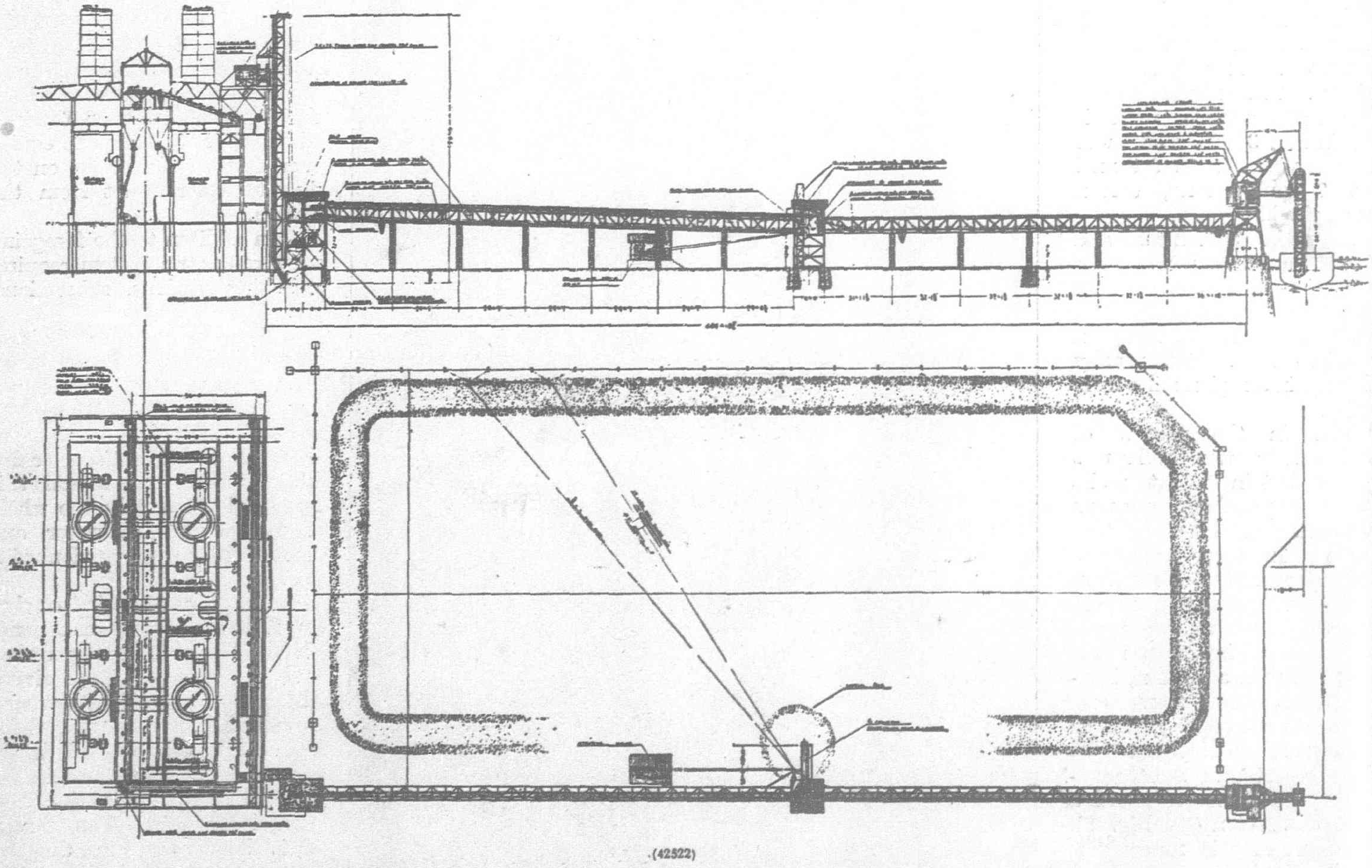


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Fig. 5.—Arrangement Plan and Elevation of Coal Storage and Method of Coal Handling at the Steam Power Station at Amagasaki

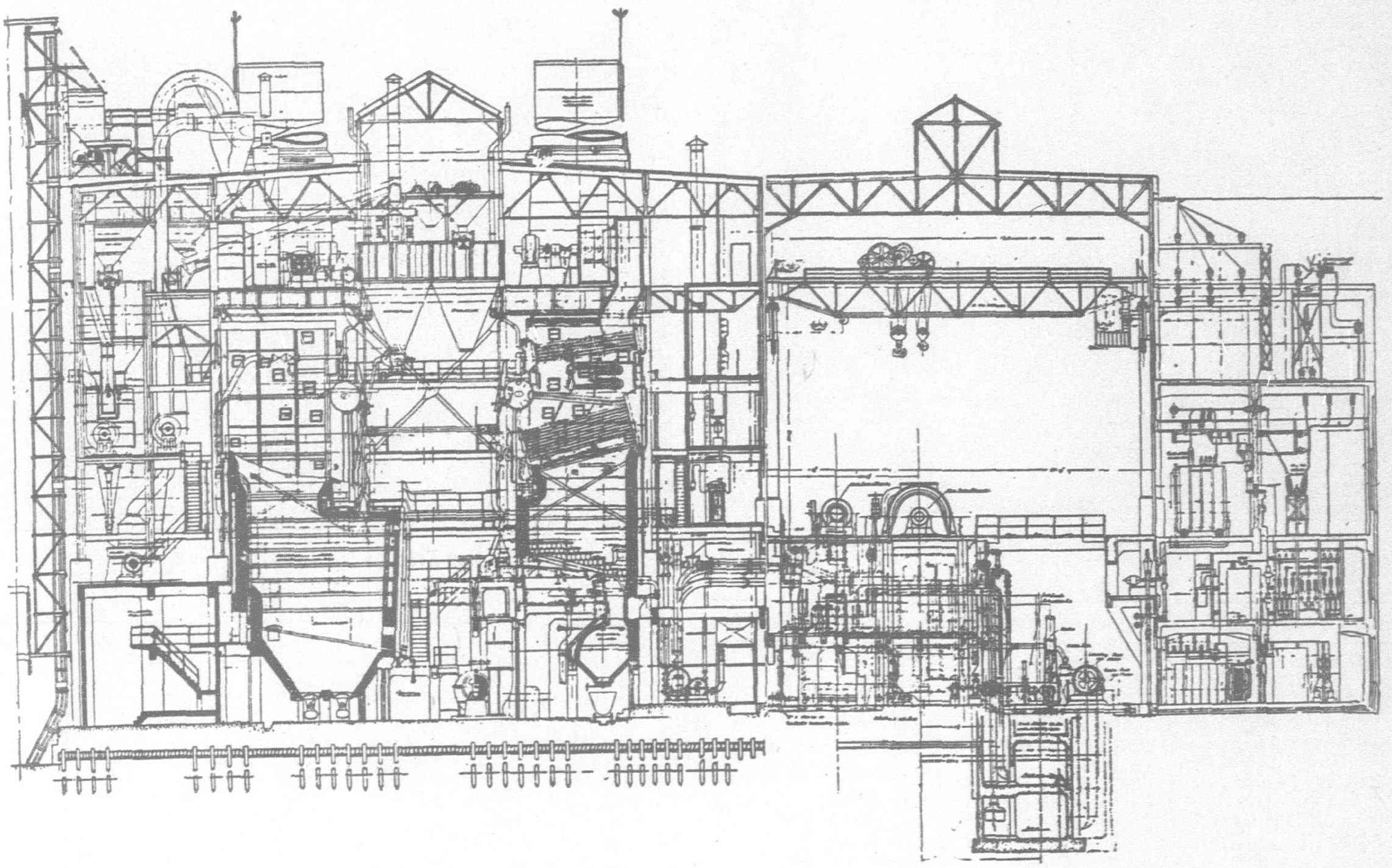


Fig. 6.—Cross Section through the Amagasaki Station from Coal Handling Plant to Transmission Line

order to cope with varying frequencies there are two methods employed; one is to install frequency changers, and the other to have units capable of being run at different speeds. Both systems are in operation, and in the latter the system most favoured is to have a generator with a special double winding, 12 terminals being brought out and arranged so that by the manipulation of a series of large knife switches the winding can be altered to suit either frequency giving the same terminal voltage without altering the exciter. If for any reason the set must be maintained in operation for long periods then the turbine runner is altered so that the improved efficiency can be obtained.

The charges which are made for current are, of course, an index of the total and final efficiency of the whole system, including the working of all the stations, the management and office expenses, the following general rule for bulk supply is noteworthy.

The bulk consumer is charged on a basis mutually agreed upon, such that the consumer must make a minimum payment for about 60 per cent. to 70 per cent. of the agreed figure whether consumed or not. Should consumption exceed this minimum figure, then the price for current in excess of the minimum is reduced.

The price per k.w. up to the minimum allowance being 2.5 sen, which at present rate of exchange is equal to 0.5d. per k.w. hour.

It should be remembered that the system consists of hydro-electric stations plus steam stand-by stations, and consequently the capital charges are very much higher than for western countries where usual equipment is a steam power station located near its load and not requiring long transmission lines or heavy reserve power.

In a short article of this kind it is impossible to deal at length with all the many and interesting technical problems. It is hoped, however, sufficient has been given to show that the Company has accomplished great things for Japan. That so many difficulties have been surmounted and that current can be supplied at so moderate a cost, is a tribute to the skill and enterprise of a good business organisation, well and ably supported by a very capable engineering staff.

In particular, the writer wishes to thank Engineering Director Mr. S. Fukunaka, and Business Manager Mr. Fukano, for their courtesy in placing at his disposal freely and generously all the information; also to all others of the company's officials during visits to the various plants, and to wish the Company the success which their enterprise deserves.

Summarised Particulars of Nippon Denryoku Co.

Amagaski Steam Power Station

PART OF PLANT	SUMMARISED PARTICULARS	MAKER
STATION CAPACITY	50,000 kw. (Installed) 140,000 kw. (Ultimate)	
BOILERS	water tube B. & W. cross drum.	Babcock & Wilcox, England.
Number installed	8	
Heating surface each ... ... sq. ft.	10,821	
Working pressure .... lb. gauge	275	
Super heat degree... F°	220	
Super heater ... sq. ft.	B. & W. 2,757	
Capacity of boiler, max. lb. per Hr.	110,000	
Heating surface of boiler per kw.	1.73 (include spare)	
Boiler rating in per cent ...	200—350	
STOKER	Riley 13 retorts	S. Riley Co., U.S.A.
Grate area per boiler .... sq. ft.	370	
Capacity max. lb. per Hr.	18,000	
Max. lb. per Hr. per sq. ft.	45	
Furnace volume ... cub. ft.	8,000	
Furnace volume per sq. ft.	21.5	
Furnace volume per lb. of coal	0.44	
Speed of stoker	80 R.P.M.	
Stoker motor ... h.p.	25	

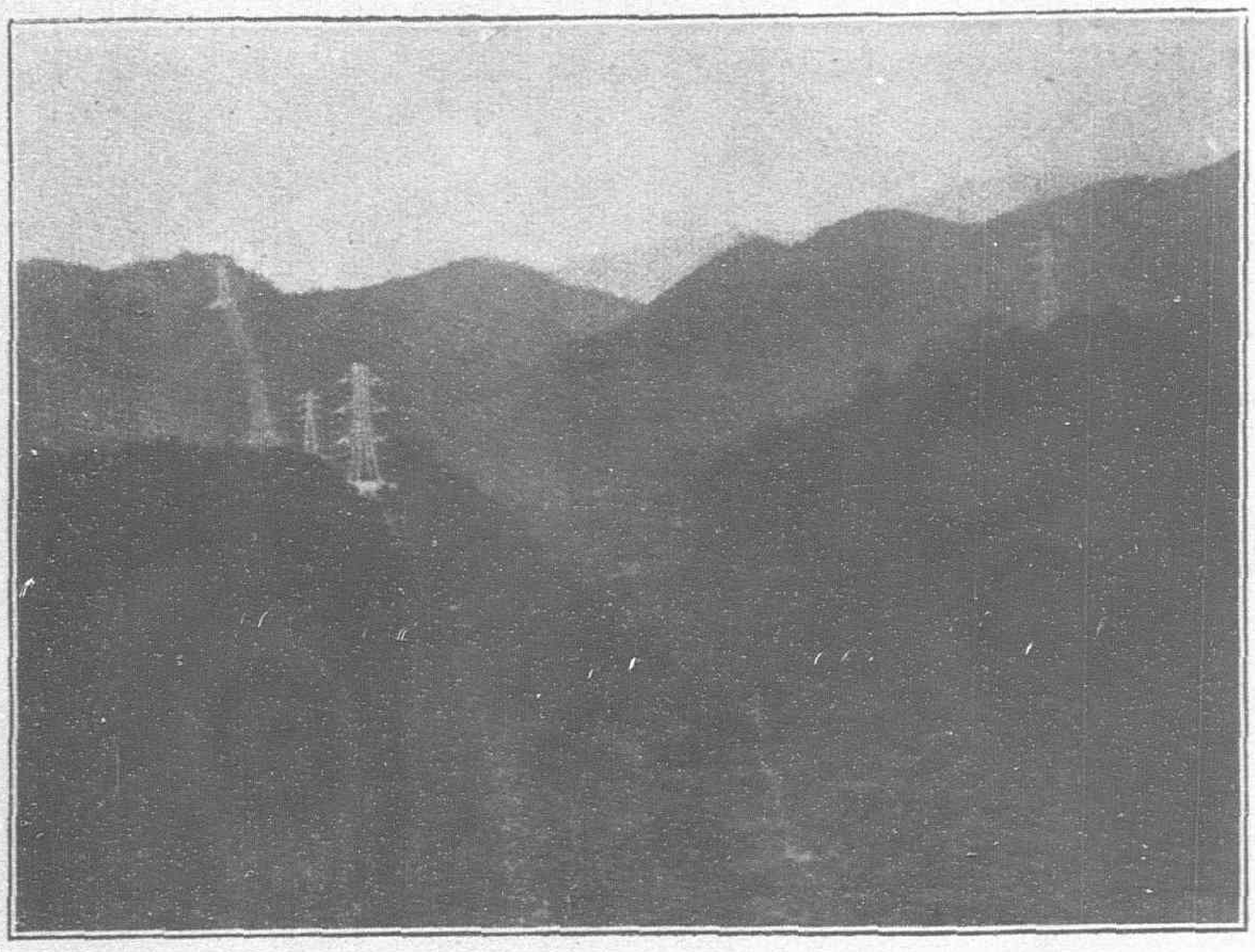


Fig. 7.—View of Transmission Line in mountainous country

PART OF PLANT	SUMMABISED PARTICULRRS	MAKER
PULVERIZER	Lopulco. 4—Feeders. 8—Burners.	Combustion Eng. Corp., U.S.A.
Capacity max. lb./Hr. ...	20,000	
Furnace volume cub. ft. ...	12,000 up water screen.	
Furnace vol./lbs. of coal ...	0.6	
Dryer	4 sets moisture from 12% to 5% and 7 tons per Hr.	
Mill	4 sets Raymond. 6 rolls 6.5 tons per Hr.	
Fineness of coal	75%—at 200 mesh. 90%—at 100 mesh.	
Blowers	3 sets. 8,200 C.F.M.	
ECONOMISER	B. & W. high pressure steel economiser, 4,476 sq. ft.	Babcock & Wilcox, England.
Raising temperature F°	Super imposed steel boiler casing up to 300°F.	
INDUCED DRAUGHT FAN	4—Multivane fan. 150 h.p. slip-ring induction motor for P. boiler. motor 514 R.P.M. Vol. gas per min per boiler at 375°F. 95,000 C.F.M. 4—Multivane fan. 200 h.p. slip-ring induction motor for S. boiler, 450 R.P.M. Vol. gas per min., boiler at 400°F. 20,000 C.F.M.	B.F. Sturtevant Co., U.S.A.
FORCED DRAUGHT FAN	4—Sturtevant fan, 6″—1,200 R.P.M., 65,000 C.F.M., 100 h.p., of turbovane double inlet type.	Sturtevant Co., U.S.A.

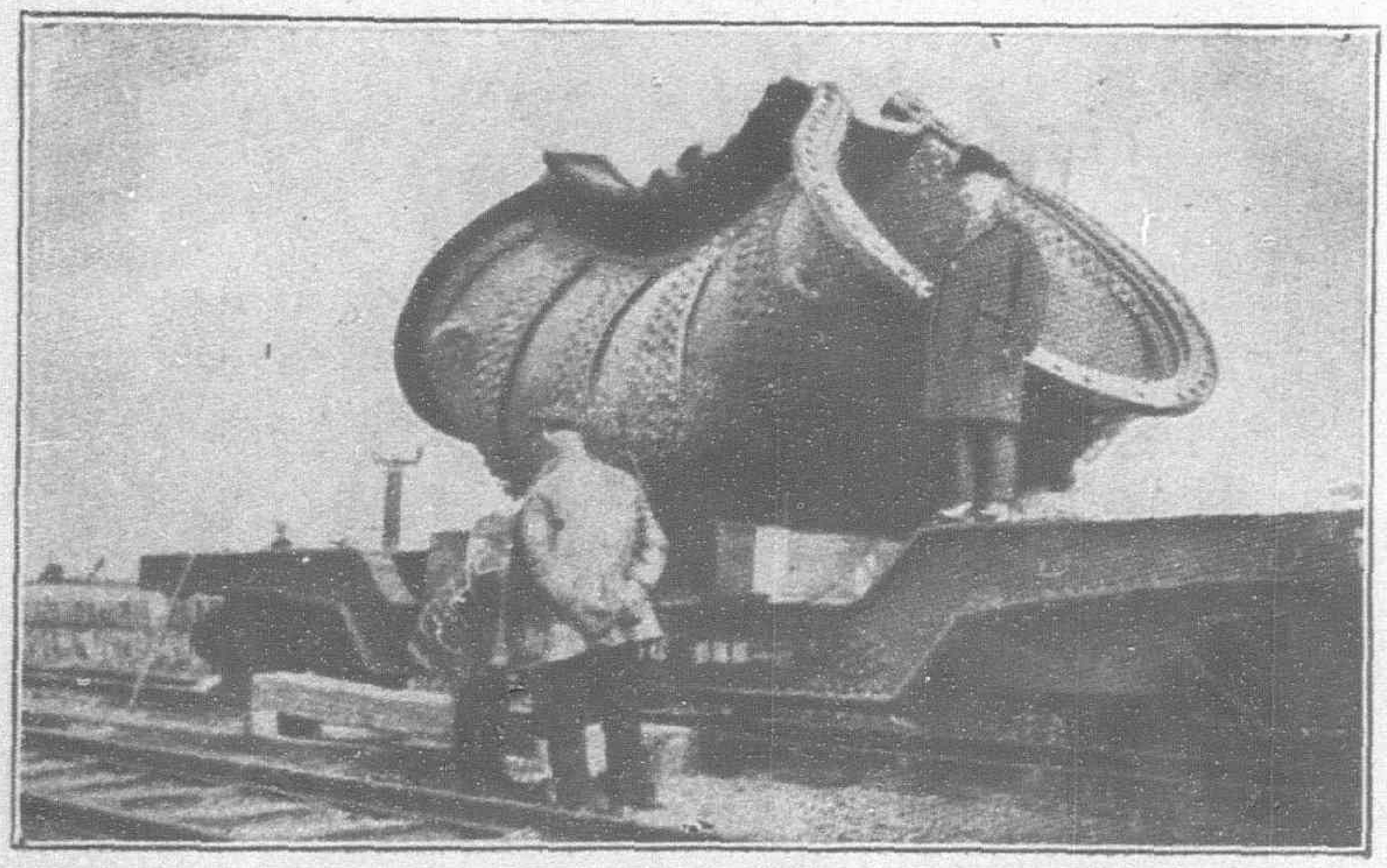


Fig. 9.—Another piece of Turbine Casing

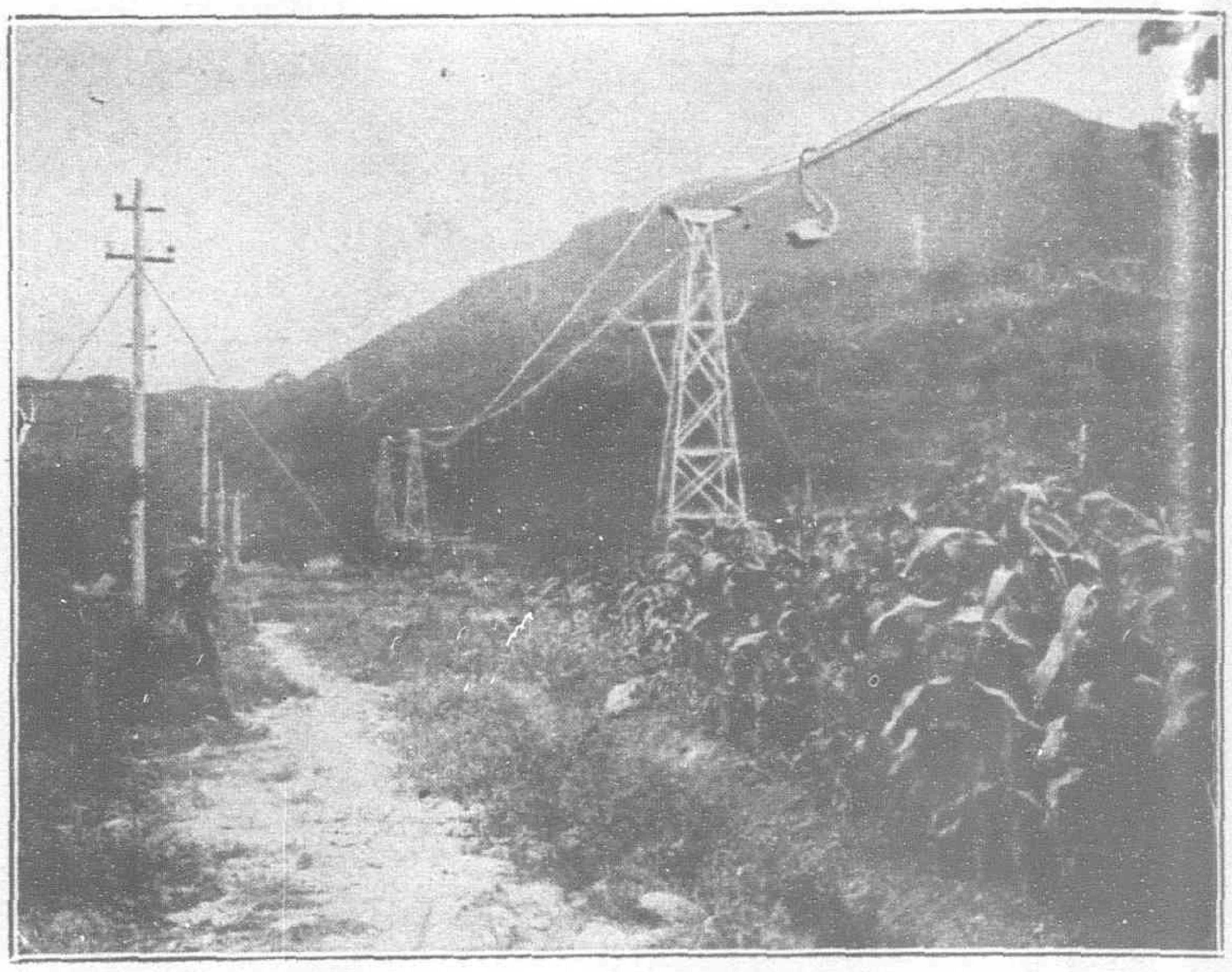


Fig. 8.—Ropeway Transportation System for Kanidera Station, about 16 miles

PART OF PLANT	SUMMABISED PARTICULARS	MAKER
STACKS	Steel stack	
Diam. at top height ft.	13′—0″ × 152′—0″ 130′—0″ above grate.	
Area sq. ft. ... top	133 sq. ft.	
BOILER RATIOS		
Ratio G.A. to H.S. of boiler	1 : 29.2	
Ratio super-heater surface to H. S. of boiler ...	1: :4.0	
Ratio in econ. surface to H.S. of boiler	1 : 2.4	
Stack area to H.S. of boiler	0.0061	
Flue area to H.S. of boiler	0.0074	
Connected grate area per sq. ft. of stack	5.6	
PUMPS		
Boiler feed pump	2—8 stage 6″ centrifugal turbo-pump each 700 G.P.M. 1—4 stage 6″ centrifugal turbo-pump, 700 G.P.M., two motor driven, one turbine driven.	Rees Roturbo Mfg. Co., England.
Sea water pump	2—1000 G.P.M. 35′—head. 1—200 ,, 200′— ,, 2—600 ,, 115′— ,,	
Raw water pump	3—350 ,, 125′— ,, 1—300 ,, 125′— ,,	
Surge pump	2—100 ,, 100′— ,,	
High pressure pump ...	1—400 ,, 350′— ,,	
Tanks	No. of tanks, 13.	
FEED WATER HEATERS	One per unit, closed type. 1—150 sq. ft. gland heater. 1—800 ,, integral heater. 1—450 ,, high press. heater.	Metropolitan-Vickers, England.

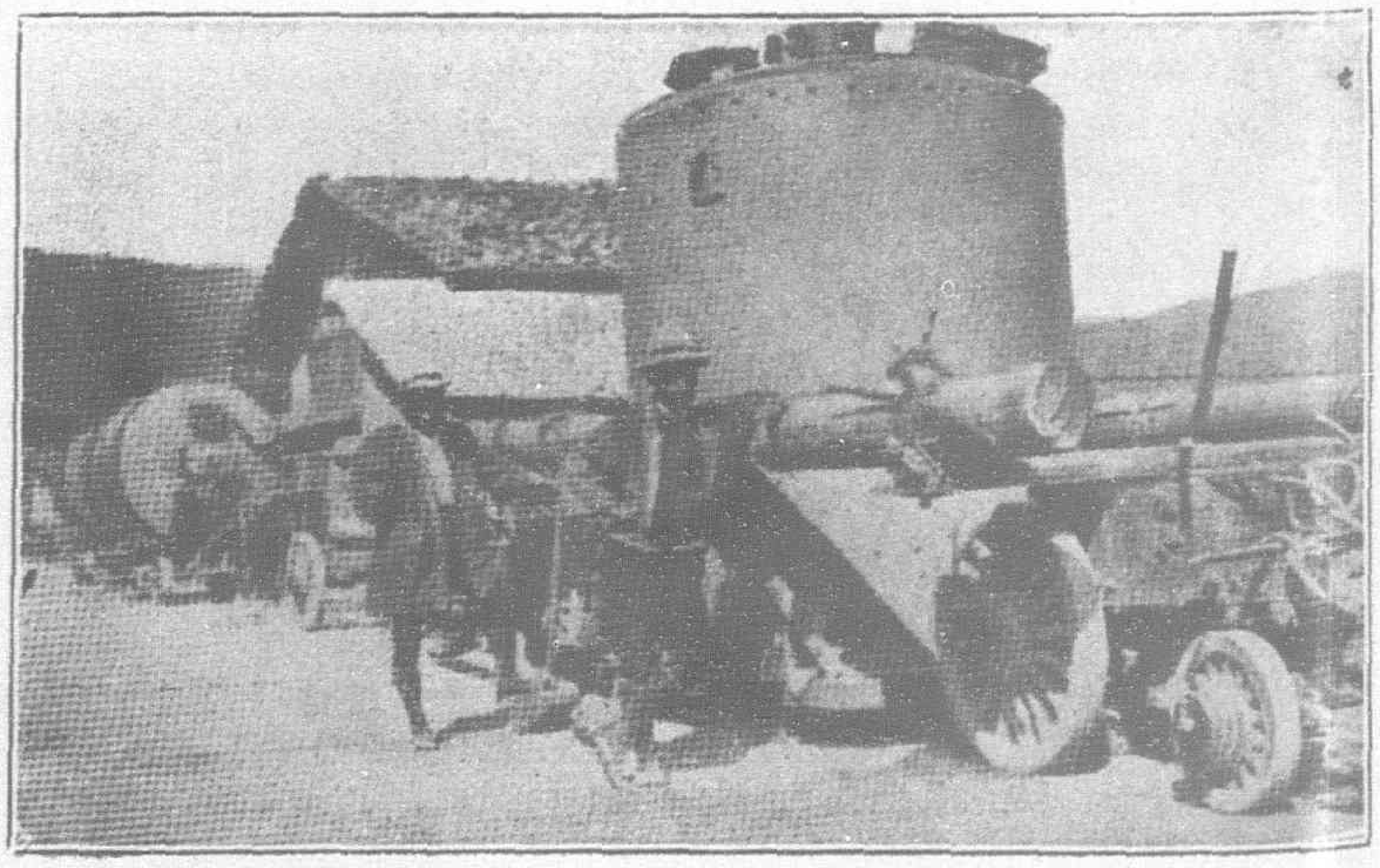


Fig. 10.—Oil Switch Tank on the road to the Power House

Part of Plant	Summarised Particulars	Maker
Evaporator	10,000 lbs./Hr. of low heat level.	Weirs M. J.G.W., England.
Heat Balance Scheme	Heat balance by feed heating in 3 closed heaters, of two-stage bleeding. 3—heaters per unit, capacity 320,000 lbs. of water heated to 220°F. per hr.	
Coal Storage	400′—0 × 200′—0 with power hoe equip.	Link Belt Co., U.S.A.
Coal bunker	125 tons per boiler.	
Skip hoist	80-ton balanced type.	
Coal conveyor	5—belt conveyors, 50 tons per Hr. each	Aji. Kawa Ironwk's.
Unloader	1—Continuous bucket elevator, 50 tons per hr.	
Main Turbo-Generator Sets	2—M.V. single cylinder 12 Rateau stages and duplex multi exhaust stage of Baumann type.	Metro-politan-Vickers, England
Capacity	25,000 k.w.	
Power factor in per cent	100	
Steam pressure lb. gauge	250	
Superheat degree °F.	200	
Speed R.P.M. frequency	1,800 60—3 phase	
Terminal voltage	11,000	
Air for cooling C.F.M.	55,000	
Air cooler	One per unit, surface type, 700 G.P.M. of cooling water. One main field rheostat motor-operated unit.	
Exciter	One to each unit direct connected 202 volt, 110 k.w. One spare, motor-driven 150 k.w.	
House Turbo-Generator	1—1,750 kva., with condensing plant, 3,600 R.P.M., voltage 3,300 volts. Exciter voltage 110. Cooling air 6,000 C.F.M. of surface cooler.	Metro-politan-Vickers, England.
Oil Filter	3—Fox oil filters.	M.V.
Condenser	2—Surface, two flow.	Allen & Son Co., England.
Cooling surface of each sq. ft.	35,000	
Cooling surface per kW.	1.4	
Steam condensed per sq. ft.	8.37	
Vacuum inches	29	
Water Screen	4—Travelling screen, 7 width.	
Condenser Auxiliaries		
Circulating pump	Two per unit 34″—18,500 G.P.M.	Allen & Son Co., Englad.
Driving motor	Induction motor, 160 h.p.	
Speed R.P.M.	600	
Condensate pump	2—Per unit 6″—800′ G.P.M.	
Driving motor	Induction motor, 70 h.p., 1,800 R.P.M.	
Air pump	2—Per unit, kinetic air pump. 45 h.p., motor-driven, combined with steam set air pump.	
Cir. water per lb. of steam cond.	74	
Crane	80-ton—55 ft. span.	Hitaghi
Piping	All high-pressure piping steam, feed, drain and blow-off. Cast iron pipes, valves, for low pressure.	Babcock & Wilcox.
Lagging	Pipe covering and other laggings.	
Furnace Material	Casting for flat arch, firebricks.	
Meters	3 Steam flow meters.	Kent
	8 ,, ,, ,,	Republic
	11 Temp. recorder.	Cam b'ge
	14 Recording pressure gauge.	,,
	8 CO^2 and temp. recorder.	,,
	5 Pyrometer (Multi pt.).	,,
	3 Vacuum recorder.	,,
	7 Venturi meter	Simplex
	8 Draft gauge.	Bailey
	1 Condenser efficiency meter.	M.V.

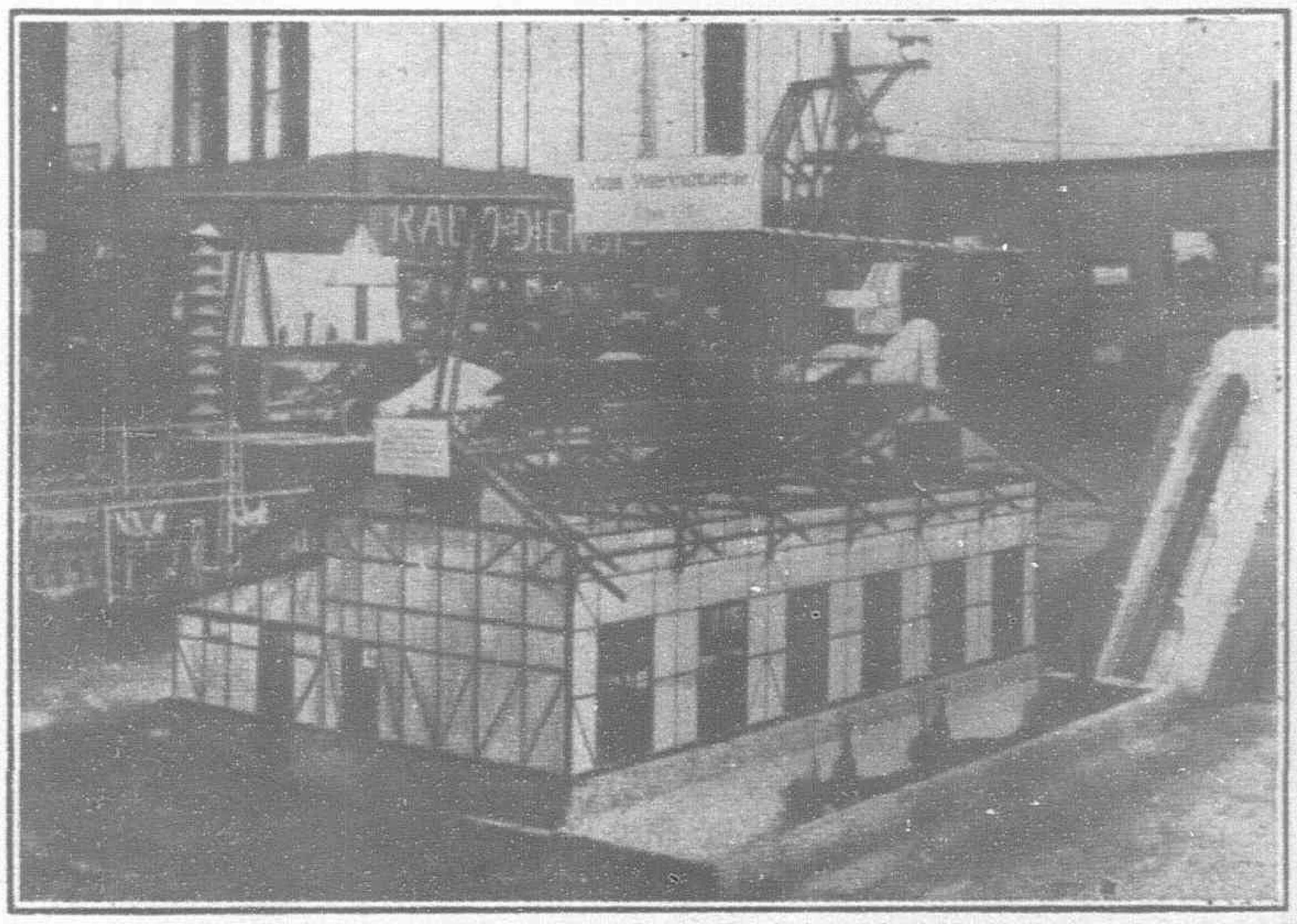
Part of Plant	Summarised Particulars	Maker
Switching Equipment	Westinghouse Electric International Co. Design.	
Transformers	Main Transformers. 6—8,333 kVA., 11,000/77,000. House Transformer. 4—2,000 kVA.	Siemens Schuckert Design. Gen. Elec. Co., Design.

An Electrical Exhibition in Java

LAST year there was held at Bandoeng, Java, an important electrical exhibition under the auspices of a government department locally, known as W. & E., which is responsible for the city's electricty supply.

As a part of the W. & E. exhibit there had been constructed by its employees a power house in miniature, modeled after one of their hydro-electric stations on a scale of 10 to 1. The pipe line was shown coming down a mountain side, and within were two motor-driven generators, switchboard, and traveling crane, all made to scale. There was also a miniature reproduction of an outdoor switching station.

The International General Electric Company, through its local office in Soerabaia, introduced a great variety of electrical appliances for household and other uses, together with the Radiola superheterodyne and other devices of the Radio Corporation of America, and the "speedway shop" or electrified tool kit that was described in our last issue.



Miniature Reproduction of W. & E. Power Plant

Included also in the I.G.E. exhibit were X-Ray photographs of great interest, and oscillograph records of the human voice. By means of a portable demonstrator, the color effects produced by different types of lamps on colored goods were shown, and there were also exhibited illuminated colored views of many typical street scenes in cities of the world that are lighted by General Electric equipment.

Occasion was taken to present free lectures on electrical subjects to the great interest of the populace, who after each talk were given a view of motion pictures, depicting matters of interest connected with the electrical industry.

Chinese Turkestan and Central Asia

By Lieut.-Colonel P. T. Etherton, late H.M. Consul-General and Political Resident in Chinese Turkistan

CHINESE Turkestan, situated as it is in the center of the Asiatic continent, bounded on the south by India, Tibet, and the Pamirs, and on the west by Russian Turkestan, is of great political importance to Great Britain, not only because its southern border marches with the northern frontiers of India, but from its being so powerful a factor in the Central Asian problem. A review of conditions prevailing there at the present moment and the outlook for the future will, therefore, be of interest from a commercial as well as a political aspect.

Prior to the war, and the revolution in Russia, it was an accepted probability of political development that Chinese Turkestan would pass into the hands of Russia, but that has been averted, for the moment at any rate, although with the clouds looming up on the Central Asian horizon and the advent of Afghanistan as an independent state, we cannot legislate as to the attitude of the contending factions.

Chinese Turkestan figures prominently among the undeveloped areas of the world; its natural wealth is as yet unexploited and herein lies a field for mining and commercial enterprise. Gold is found in the southern part of the province and in the mountains fringing the northern border of Tibet, whilst distributed generally throughout the country are extensive deposits of coal, iron, sulphur, salammoniac, gypsum, lead, and jade. There are also oil fields in the area known as Kashgaria, but the industry is at present a monopoly of the Chinese Commander-in-Chief who has fitted up a primitive plant, and exploits the wells with the aid mostly of the local army, they laying aside the rifle and bayonet for the more lucrative occupation of oil refining.

Speaking generally Turkestan is a land of deserts and sand dunes, the rivers and streams rendering cultivation possible by means of irrigation channels. Only in the vicinity of these waterways is cultivation met with, the rainfall being insufficient in itself to ensure the successful exploitation of the land. The bulk of the people are Turkis, a mixture of the original Iranian inhabitants of Central Asial with their Turanian conquerors, the Usbegs. The Turkis are engaged in agriculture and commerce, and are Mohammedans of the Sunni order.

The population has many diverse elements, especially in the north for in the district of Ili and Kulja, the famous bone of contention between Russia and China in 1881, we have the meeting place of the Turanian races of Asia with those of the Mongols from China. It is in this district that the Bolsheviks hoped to find a favorable field for their campaign of Asiatic intrique and revolution. The Soviet plans, of which practically nothing has been heard in Europe, for the so-called emancipation of the East, have not fructified, for none of the tribes and races show any eagerness to be emancipated by this particular means. Moreover, despite the drawbacks and indifference of Celestial rule the people rest content with it, and no revolution has disturbed the peace of the country, since the overthrow of the Mahommedan adventurer, Yakub Beg, some fifty years ago. In connection with the latter there is a remarkably interesting prelude to the reconquest of Turkestan.

A general was selected, and, with his nondescript army, he set out on the march across China to Turkestan, more than three thousand miles distant. The despatch of an expeditionary force in China lacks the skill and finish of the West, supply and commissariat services were wanting, but the general was directed to get to his destination and restore the lost province, and so he set forth. Long before the frontiers of Turkestan were reached supplies gave out, so with that wonderful tenacity and patience characteristic of the Chinese, the general halted his army, seed was produced and sown, and in the fulness of time the crops were gathered in, supplies were replenished and the army resumed its march, the plan being repeated until the goal was attained and Turkistan brought once more under the imperial sway.

There are no roads properly speaking in Chinese Turkestan, ways and communications being confined to mere tracks. Closely allied to the latter is the question of the military forces and the means to resist potential aggression. These are negligible and the army is unprovided with transport, supply, medical, or other administrative services. The troops, beyond a few rough movements in the handling of arms, do not undergo any drill or tactical training. The prevalent internecine warfare in China has exerted an adverse effect upon the army which has lost its national character and developed into a collection of provincial units, each working under the orders of its provincial chief, who acknowledges no allegiance to the central authority. This applies especially to Turkestan, the Governor of which maintains an attitude of quasi-independence and heeds the behests of Peking only when it is convenient to do so.

The majority of the garrisons enjoy a merely fictitious existence, and the strength of the provincial army varies with the frequency, or otherwise, of inspections. In theory units are kept at full strength, but in practice they fall much below that desirable standard. Recently an inspecting officer visited the headquarters station, and great activity was displayed for some days prior to his arrival in gathering in from the highways and byways the requisite numbers to swell the total so that it might correspond with that shown on the rolls. With the departure of the inspector these temporary warriors were released, their normal occupations were resumed, and general and commanding officers breathed freely once more.

Military reform can only be effected with the aid of foreign capital, technical advice, and assistance, which, since the Washington Conference, the Chinese are most chary of admitting for they regard them as prejudicial to their sovereign rights and a direct blow at the fundamental principles of their policy.

Although Chinese Turkestan is rich in mineral resources no attempt has yet been made to develop them, but they would command a wide and ready market if opened up and exploited by foreign enterprise. With the establishment of a stable government in Russia and the re-opening of the railways, must come a great trade boom in Central Asia in general and Turkestan in particular, with opportunities to work the extensive oil and other deposits. Japan and America are already in the field and have initiated a campaign for a foremost place in this new commercial sphere.

Turning from commercial activities to those of a political nature it will be of interest to see what progress the Bolsheviks have made in their campaign to inflame the East and the Asiatic continent generally. With the passing of Lenin, and the critical situation in which Communism now finds itself, a change has come over Bolshevik policy and movements in Turkestan. Not only the native states of Bokhara

Kirghiz—A Sturdy Race Opposed to Soviet Russian Influence in Central Asia

and Khiva, but all Central Asia, are against the Bolsheviks, and the schools formed in Tashkent, the capital of Russian Turkistan, for the training of propaganda agents of varied Oriental nationality, have not been a success and the seed therefrom has fallen on stony ground.

Kirghiz Cavalry are Mounted on Yaks

Across the Chinese border in Ferghana, the richest province of Russian Turkestan, there is strong opposition to the Soviet, and, although the latter is in nominal possession of the country, in actual fact the Bolsheviks hold only the towns, the area beyond being in the hands of the Mahommedan insurgents. Although anxious to retain their hold on Turkestan the lack of supplies, the general disorganisation, and the dilapidated state of the railways, render the Bolshevik occupancy somewhat precarious, despite the recent concentration of troops there which assumed a somewhat menacing aspect towards Afghanistan and Persia. It is interesting to note, a fact not hitherto known, that the leader of the Mahommedan insurgents expressed a desire to come under British rule, yet another testimony to the power and solidity of the British Empire. It was, however, decided some time since that H.M. Government could no longer continue the assistance that had been granted to various bodies and anti-Bolsheviks organisations in Asia, and the obvious corollary to that decision was not engaged in fresh commitments, and no assistance has, either directly or indirectly, been given to any such organisations.

The subject of Pan-Islamism is a vital one, and as the greatest Mohammedan power in the east we are directly affected by it. Prior to, and during the war, a nationalist movement arose in Turkey which demanded that the Ottoman empire, and the races in affinity with it must assert themselves. The advent of the Bolsheviks, and the subsequent spread of anarchy and disaffection in Central Asia, gave an impetus to the movement, but at the present moment the movement is merely platonic and the danger of its assuming concrete form is remote. A short while since overtures for the formation of a Moslem combine in Central Asia were made, but there was no sympathy or enthusiasm for the movement, doubtless due to the jealousies existing amongst the various parties to the suggested alliance, in addition to which the politically independent factors are divided amongst themselves.

The Kashgar Market Place—Center of the Economic Life of Turkestan

The Bolsheviks expolited the Pan-Islamic movement to further their designs in Turkestan and the Far East, and it may be wondered to what we should attribute the failure to inculcate Bolshevism in Central Asia and Western China. Soviet ideas do not find favor for they interfere with private liberty, a leading feature in the social life of China, whilst they strike at private trade which is vital to the Chinese nation. Moreover, there is a feeling in favor of the restoration of the monarchy, for a republican form of government is unsuited to the Celestial temperament. The essentials of republicanism do not exist in China, and until they are created the form of government must be oligarchic. With a republic there is necessarily a change of leader, and this, in itself, invests the head of the nation with transitory power, and one without prestige, whilst it lacks the main feature of imperialism, as the term is understood in China, that of concentrating authority and focussing the loyalty of the masses.

The peace of Central Asia and Turkestan will be affected by what transpires in Russia and the restoration of law and order in Central Asia, and once affairs assume a normal aspect much can be made of the commercial possibilities. The requisite capital and initiative must come from Europe or America, and therein lies ample scope for those who are interested in the exploitation of the oil, cotton, coal, and the numerous other riches of Turkestan. riches of Turkestan.

In the foregoing notes I have endeavored to present the position in Turkestan as it is to-day. Its political, economic, and industrial questions must be one of the factors affecting the balance of power in Asia ; they require careful watching, for British interests are involved and the problems arising therefrom are of far-reaching interest and importance.

Westinghouse International Awarded Japanese Order

Tokyo Electric Light Co. Gives Contract for Transformers To Cost $400,000

The Tokyo Electric Light Co., the largest distributor of electricity in Japan, has just placed an order with the Westinghouse Electric International Co. for four 25,000 k.v.a. transformers, single phase, for 154,000 volt transmission.

These transformers are to be duplicates of six others ordered by the same company from Westinghouse about eight months ago. The physical proportion of these transformers is larger than any others ever built by Westinghouse and perhaps the largest in the world.

It will be necessary to build the tanks in three sections to permit transportation by rail. The order also includes high tension switching equipment for protection and control of the 25,000 k.v.a., 150,000 volt transformers.

The total value of this contract is approximately $400,000.

Design of a Reinforced Concrete Floating Dock for Service on Upper Yangtze River.

By H. K. Chow, S.B., S.B., S.M.

READ BEFORE THE ENGINEERING SOCIETY OF CHINA

THIS paper deals with the design of a reinforced concrete floating dock, or to be more exact, of a floating dock of composite construction having its main structure made of reinforced concrete and side walls planked over with timber. It is intended to serve the steam-ships on that stretch of Yangtze River known as Upper Yangtze, *i.e.*, between Ichang and Chungking, a distance of 350 miles. The operation of a floating dock is extraneous to this discussion and is not touched upon. In particular, stress has been laid upon the data which go to make up the design, and the logical reasoning with which the conclusions are arrived at.

Location of the Floating Dock

Shipping requires ships, and ships, like everything else, deteriorate with time and under service. Moreso it is with ships in this service which require more care in handling and more repair every year for two reasons. Firstly, in order to cut down deadweight and to give more room to propelling machinery and space for cargo, the scantlings for these ships are usually light. That means they are comparatively frail structurally, and the non-rigidity of the hull and the high speed of the machinery induce vibration to a degree that is hard on the structure, in consequence of which, frequent repairs have become necessary. Secondly, the navigating channel is full of under-water rocks, landslides here and there, and rock banks everywhere. The current is so swift that even with the greatest care of the best pilot, the vessel is liable to founder and holes in the hull after a trip are of common occurrence rather than exceptions. A good-sized repair shop at each or both ends of the channel is of great importance and should be welcome by all shipping interests.

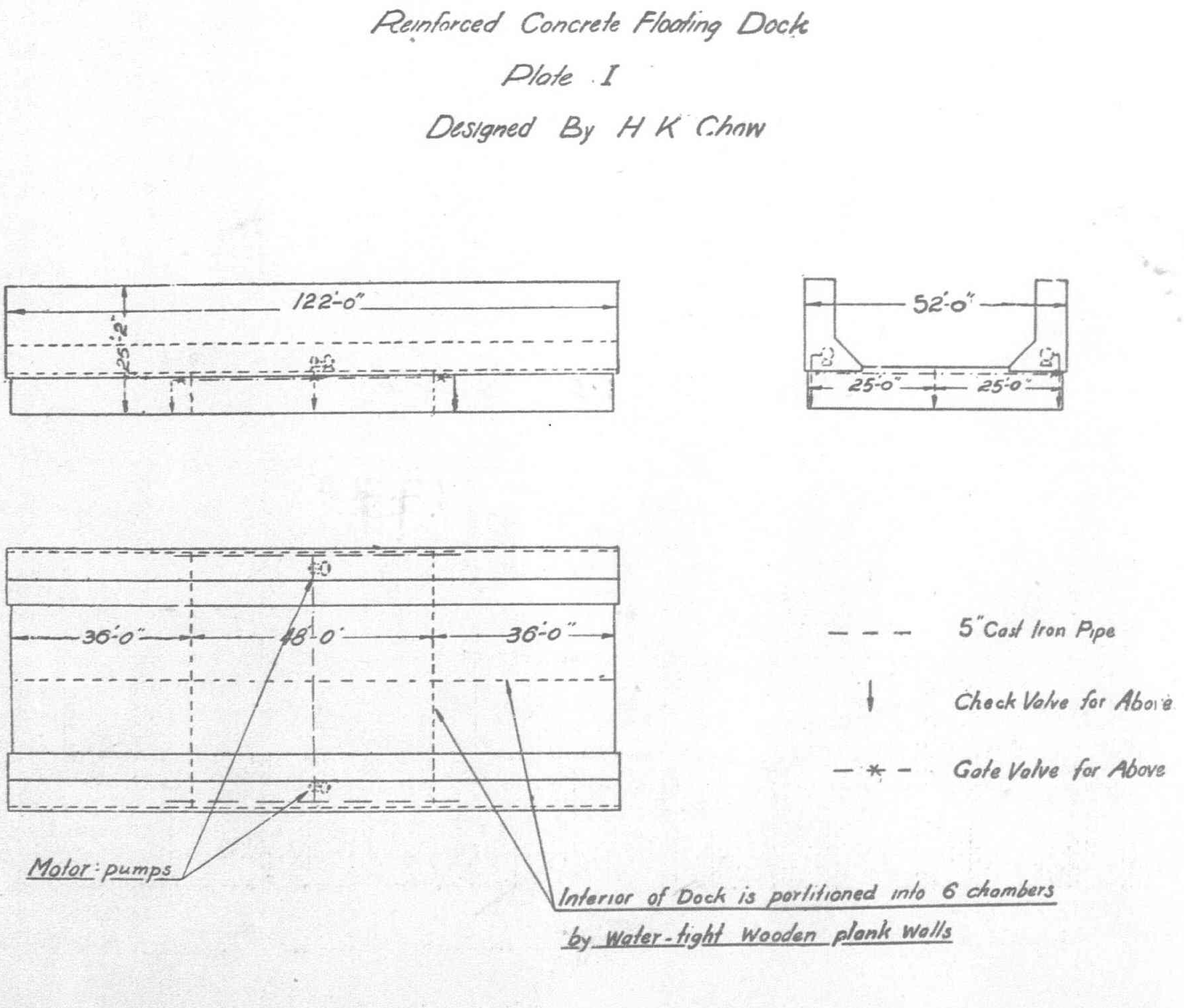

Reinforced Concrete Floating Dock

Plate I

Designed By H K Chow

Enquiries made by the writer among the ship owners confirmed the need of such a shop. As the matter stands now, when a hole is made in a hull it is patched with bags of cement; repairs of a very limited character are made by the small shops having a few pieces of machine tools. For big repairs and the annual overhauling, these steamers invariably come to Shanghai to dock. Nowhere along the whole Yangtze River below Chungking is there any facility for docking the steamers and making the necessary repairs in a first class way. In making this round trip, the ships of the Chi-King Class, *i.e.*, 165 feet long, 26 feet beam, 250 tons deadweight burned coal to the value of $5,000. The loss of freight during the trips is very large indeed. It is therefore seen that if these repairs could be undertaken in Ichang or Chungking the saving to the shipping interests will come to large figures.

The question arises as to where the floating dock should be located, Ichang or Chungking. It is the writer's belief that the location at Ichang should be chosen, for the following reasons: Firstly, since all the shipping companies have their managing headquarters in Ichang, this location is preferable from a business point of view. Secondly, Ichang is comparatively near to Hankow where supplies of metal and other materials can be drawn in large quantities and at reasonable prices. Thirdly, for the same reason, skilled labor can be more easily obtained. Fourthly, there is a regular shipping service between Hankow and Ichang (with a type of boat smaller than those on the Shanghai-Hankow run), thus insuring good communication. Finally, the seasonal fluctuation of water in the River is much smaller at Ichang than at Chungking, 60 feet against 100 feet. A floating dock must move with the changing level of water. The difficulty of managing a floating vessel in a place where over night the water level may change twenty feet is too obvious, and a location which will minimise such difficulty should be selected. Reasons one to four are commercial, while the final one is technical.

Choice of Type of Dock

Having fixed the location of the plant, the next consideration is the selection of type of dock. The selection should be based upon the following considerations,

(1) It must be a floating structure.

(2) It must be as economical as consistent with strength.

(3) It must be easy to handle.

(1) A floating structure is selected because the rise and fall of water in this part of Yangtze is easily 50 to 60 feet. A graving dock such as those in Kiangnan Docks has to rest on solid foundations well piled, has to be provided with side walls 70 feet to 80 feet high, and an entrance gate of like depth under enormous hydraulic pres-

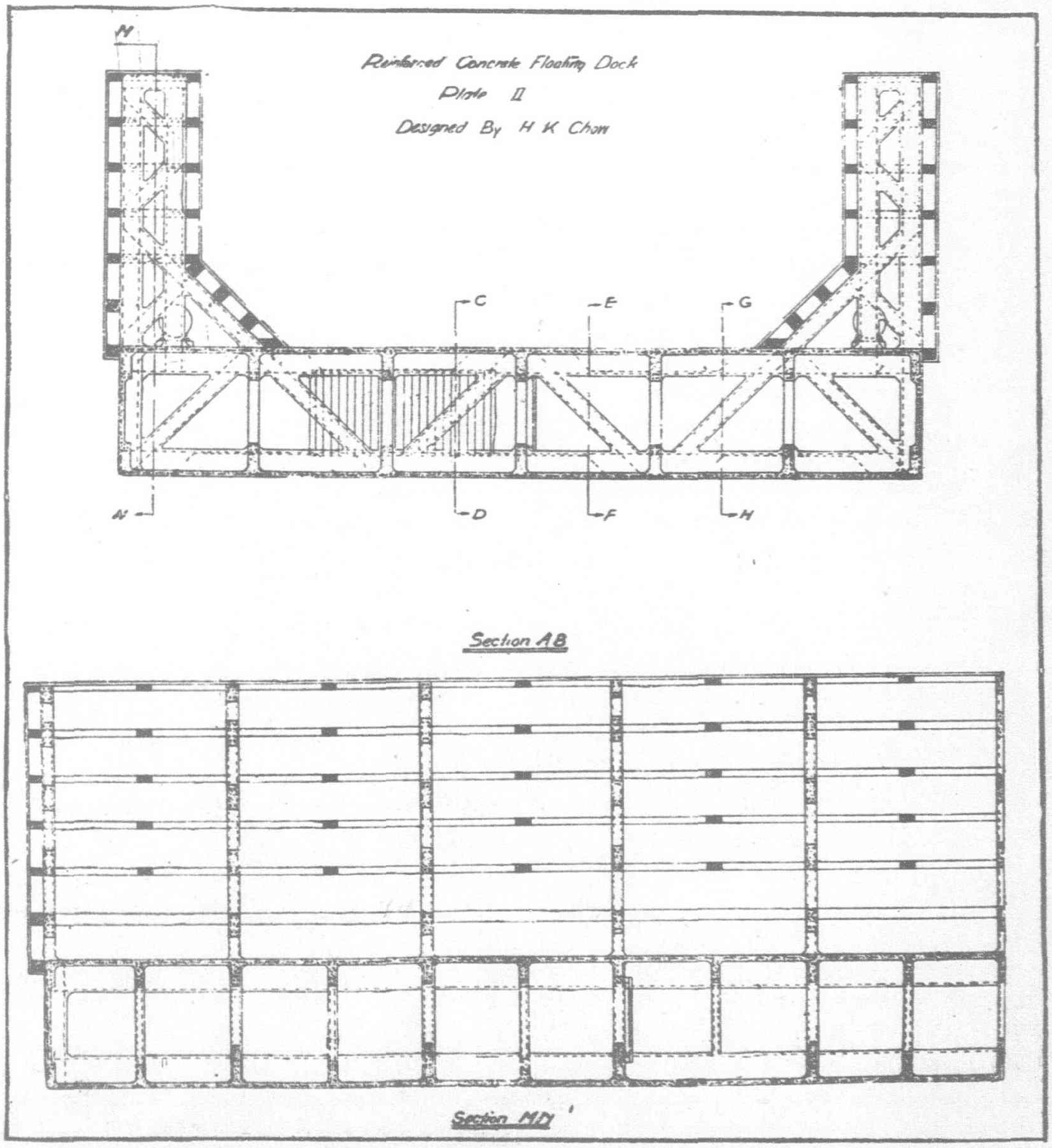
sure during high water season. The capacity of the pumping machinery must also be unusually large in order to cope with the very large volume of water to be pumped out. Not only is the initial cost enormous, but also the operating expenses will be very high. And from an engineering point of view the writer doubts if a graving dock of such depth in comparision with its length and breadth has ever been designed, constructed, and successfully run for a seasonal fluctuating water head of 50 to 60 feet. The engineering difficulties are tremendous.

Nor can the idea of a slipway be entertained. Slipways to be practical, cannot have inclinations greater than 1 in 13, or 1 in 20, the latter being the usual slope. For a tide range of ten feet at the seaboard, means a length of 200 feet excluding the portion under water below the lowest tide. But here we have an annual variation of water level of 60 feet. If the same slope is maintained throughout, and if the slipway is for service all the year round, it must have a length of over 1,200 feet. Not only is the cost prohibitive for such a structure, but also the engineering difficulties will be very great when we remember the treacherous nature of the Yangtze silt forming the banks.

Hence, the only other alternative is a floating dock. Docks of this type are new in China, although quite common in foreign countries, especially in England, where at Southampton a 60,000 tons dock was this year completed. The only floating dock in China to the writer's knowledge is the one owned by the Yangtze Engineering Works of Hankow, now defunct. It is 80 feet by 25 feet, constructed of steel and can dock vessels up to 200 tons. The structure is, however, frail, and its capacity is too small for Ichang-Chungking boats.

(2) The design must be as economical as consistent with strength. This requirement is, as a matter of fact, common to all engineering designs. For what is the use of having a structure that is overstrong and very expensive. There is the double waste of capital and material. Moreover, in a floating structure, too much material means greater deadweight, and less carrying load. In this case, the measure of efficiency is the minimum of first cost per ton of maximum weight of ship to be lifted.

(3) It must be easy to handle. The writer's first design was one of the self-docking type consisting of three sections each 33 feet long, 45 feet wide and 5 feet deep with appropriate side walls. It was felt, however, that in view of the swift current in the stream, it would not be safe to have three separate sections, the joining of which was a difficult task at best. Moreover, since these steamers are of light construction for the same power and tonnage, yielding of one section of the dock relative to others will throw an unusual strain upon the hull, a procedure to which the owners would have good reason to object. The final design, as shown in the accompanying drawings, consists of one piece pontoon and two side walls integral with it giving a rigidity quite necessary under the conditions of river current and hull construction of the steamers. The handling is thus rendered simple.



Determination of General Dimensions

Having selected the type of floating dock, the next step is to determine the general dimensions. These should suit the size and tonnage of ships now existing and those which may be built during life of the dock. It became necessary to make enquiries at shipyards that make a specialty of building these boats, as well as from the owners of these ships.

The design of early steamers followed the suggestions of Captain Plant, River Inspector, Chinese Maritime Customs, whose recommendations concerning the construction and fitting of Upper Yangtze Steamers in so far as it related to sizes and speed were as follows :

" Limit of Size.—The dimensions of steamer for running at all stages of the river, when steam navigation is possible should not exceed :—

Length	210 feet o.a.
Breadth	35 feet moulded.
Depth	9½ feet moulded.

" *Speed.*—The speed of the steamers should not be less than as follow :—

Steamers under 80-ft. in length .. .. 10 knots.

Steamer of lengths 80 to 130-ft., 11 knots,

Steamers of lengths 130 to 210-ft., 12 knots.

" These are the minimum speeds for safe navigation through races, whirlpools, and minor rapids, but are insufficient to push up over the main rapids without having recourse to warping.

" Vessels intended to proceed over the main rapids under their own steam must have considerably more power than that provided for in these recommendations."

The above recommendations were published in 1917 by the Coast Inspector of the Chinese Maritime Customs. The boats built in accordance with these recommendations were all good-sized ones. The docking weight might be easily 600 tons. But more recently the tendency is towards smaller sizes, as is shown by the following list.—

1.	Pah Tung ..	length 71-ft.
2.	Chi Chuen ..	,, 153-ft.
3.	Chin Ho ..	,, 150-ft.
4.	Chi Ping ..	,, 138-ft.
5.	Chi Nan ..	,, 120-ft.
6.	Chi Lai ..	,, 120-ft.
7.	Foo Lai ..	,, 140-ft.
8.	Yee Ling ..	,, 150-ft.
9.	Yee Pin ..	,, 150-ft.
10.	Loong Mo ..	,, 200-ft.
11.	Kiang Ching	length 200-ft.
12.	Hsin Zo Tung	,, 200-ft.
13.	Foo Yuen ..	,, 200-ft.
14.	Dah Lai Shih	,, 200-ft.
15.	Yun Yang ..	,, 200-ft.
16.	Nee Yang ..	,, 200-ft.
17.	Hsuan Jen ..	,, 200-ft.
18.	Ki Ching ..	,, 165-ft.
19.	Kiang Yuen	,, 81-ft.

The above is only a partial list, but indicates in a clear way the tendency of designers towards small sizes.

The newest addition to the fleet of steamers for service on Upper Yangtze is s.s. *Fushun*, built by John I. Thornycroft & Co., Ltd., of Southampton, England. It embodies the best practice in design and construction of this type of ship and has the very modern equipment in propelling machinery. It is a boat of moderate size and the dimensions agree very closely with the recommendations as to size of the Chinese naval architects in the Kiangnan Docks, who have had extensive experience with the design and construction of this class of vessel. The hull particulars of the *Fushun* are as follows :—

Length overall	147-ft. 8-in.
Breadth moulded	28-ft.
Depth moulded	8-ft. 6-in.
Mean draught	6-ft.
Deadweight carrying capacity on 5-ft. draft about	100 tons
Deadweight carrying capacity on 6-ft. draft about	200 tons
Cargo space measurement	23,000-ft.
Designed speed, loaded	13.5 knots
Actual speed, loaded	13.9 ,,

It is thus seen that while 200 feet steamers were popular, the more moderate sizes, 120 feet—150 feet, are the rule of the day. The reason is of course found in the better manoeuvering qualities of the smaller steamers in negotiating around the sharp bends in this part of the River.

We must therefore reasonably assume that the steamers to be docked will be of the 120 feet—150 feet class. It is good business wisdom to look ahead, and also to cater to the requirements of a majority of steamers instead of spending large sums of money just to handle the peaks only, *i.e.*, in this case, the large sizes, which, owing to the frail construction, as stated above, are depreciating badly and will disappear in less than ten years time. For a steamer of 140 feet length, the beam will be 27-ft., draft 6-ft. The total displacement in cubic feet assuming a block co-efficient of 0.7, will be 140×27×6×.7=15876. At 35 cu. ft. of water=1 ton, the displacement will be 455 tons. Allowing 70 per cent. of displacement to be the weight of hull, machinery, equipment, and fittings, in other words, the docking weight in light condition will be about 455×.7=320 tons. With due allowance for docking larger steamers, a lifting capacity of 500 tons is provided for.

Length.—If the steamers to be docked are 120—150 feet long, then a length of 120 feet for the dock will be sufficient. When the 150 feet steamers are berthed, an overhang of 15 feet at either end is permissible in practice.

Breadth.—These boats being of shallow draft, and of limited length, are usually broad-beamed. Allowing 6 feet on either side for the side walls and again 4 feet on either side for working room and shoring and 30 feet for maximum beam of the boats, then the total breadth will be 50 feet.

Depth.—The determination of this dimension requires considerable study, and is closely related to the type of structure as well as the material used in its construction. If steel is used, then the dead-weight is smaller, and the depth of the pontoon proper can be made less. On the other hand if reinforced concrete is used, as in this case it is, then the dead-weight is more, and depth of the pontoon proper must be increased in order to secure additional displacement for the increased weight. After several preliminary calculations, a depth of 8 feet was selected, due regard being given to the available data for four reinforced wharf pontoons under service conditions at the Tayeh Works and Mines, Han Yeh Ping Iron & Coal Co. (see below).

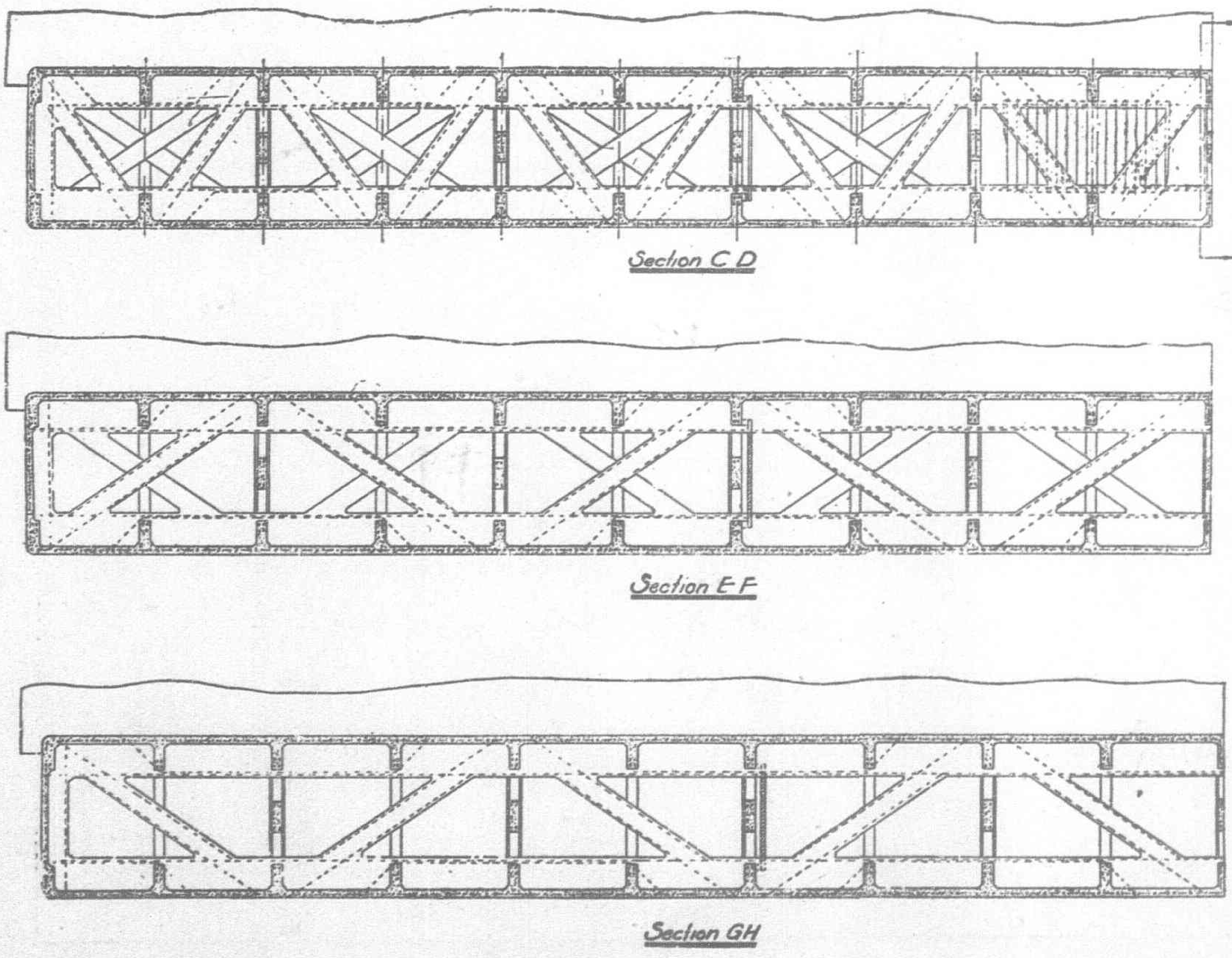
Total Height of the Dock.—The height of the structure should fulfil two purposes : (*a*) The height of the steamers up to the strength deck for shoring purposes. (*b*) The height should be such that in case of complete flooding of all compartments in the pontoon through accident the watertight side walls should afford sufficient buoyancy to keep the structure floating. A height above deck of 18 feet has been selected.

Here then we have a structure with the following maximum dimensions : Length 120 feet, Breadth 50 feet and Total Height 17′—2″+8′=25′—2″.

Reinforced Concrete Floating Dock

Plate III.

Designed By H K Chow



Detailed Design

Reinforced concrete pontoons in China are scarce, and of the reinforced concrete floating dock there is none. It would have been entirely an innovation and the design thus rendered difficult and uncertain, if it not were for the fact that in Tayeh Works and Mines there were at the wharf four reinforced concrete pontoons for shipping purposes since 1919. These pontoons have been entirely satisfactory under service conditions as to river current and inclement weather and are still giving as good a service as when new. This is attributable to the monolithic character of the structure, and to the fact that the concrete is water proof so that, unlike wood and steel, needs no painting to protect the under water portions from the attacks of elements. No repair on the under-water portion has been found necessary. Buttressed by these fine performance records the writer did not hesitate to design a floating dock based along general lines on the existing pontoons. For no test can ever be better than placing the structure under actual working conditions and observing the results thereof, which, when satisfactory, can be applied to subsequent designs of a similar nature with improvements or modifications as called for from time to time. It would be rash on the part of the designer to undertake something absolutely novel, but if he is guided by the favorable results of similar structures, though not identical, the course so proposed is not at all risky. In fact progress in engineering demands that some such steps be taken in order that the usefulness of the data may receive wider application.

Lack of space does not allow full description of all details. Only salient features can be described here. It will be observed (Plate I), that the pontoon proper is divided into six chambers or compartments four of 25′×36′ and two of 25′×48′. There is intercommunication between the compartments but the flow of water is rather restricted. This is important for trimming and stability purposes. The strength of the pontoon (see plate II) is given longitudinally by seven top and bottom girders, each 24″×8″, spaced 8′-4″ apart; and transversely by eleven top and bottom girders each 20″×6″, spaced 6′ apart; and the whole skeleton is covered or united by a continuous slab of 4″ thick corresponding to the plating of a steel floating dock. There are diagonal bracings for all the girders and the usual fillets and haunches at intersections of different members; also columns at stated intervals.

The superstructure consists of two side walls each 6′×18′×120′. The strength part consists transversely of vertical latticed columns 4′ wide, 8″ thick, spaced 12′ apart; and the cover part consists of wooden planking 2″ thick. The whole superstructure is caulked to make it watertight.

There are two electric pumps, one on each side, located above the pontoon deck, of such power and capacity as to empty the entire contents of water in 5 hours. There are the usual bollards and capstans for mooring the dock; flooding valves for sinking the dock; inclinometer for keeping the dock in trim while rising and falling.

Weight, Capacity and Efficiency

Total Weight in long tons :—

Concrete parts	595
Steel bars	51
Wooden parts	79
Pumping and Mooring Equipment ..	10
	735 tons

Lifting Capacity :—

Volume of the pontoon proper 8′×50′×120′ .. .. 48,000 cu. ft.

Force of buoyancy when immersed $8' = \frac{48,000}{35} =$ 1,337 tons

Net lifting capacity ×1337—735 602 „

Efficiency of the Dock $\frac{602}{1337}$ .. 45 per cent.

Stability

Stability is that property of a floating body in a liquid which, when the body is displaced by any external moment, tends to return to its former position. The degree of stability is measured by the metacentric height at varying depths of immersion, and is found by subtracting the distance between the centre of gravity and centre of buoyancy from the distance between the latter and the metacentre. In symbolic form it can be stated as follows.—

$$GM = BM - BG = \frac{I}{V} - BG \text{ or } (I - BG \text{x} V)/V$$

where GM is the metacentric height; I is moment of inertia of the water plane about the longitudinal axis; V is the volume of immersion up to that water plane; BG, the distance between the centre of gravity and centre of buoyancy. In the case of a floating dock where water is admitted into the interior of the vessel, the equation is modified as follows :—

$$GM = (I - GB \text{ x } V - \Sigma i)/V$$

where Σi=summation of moment of intertia of inerior contained water surfaces. With a ship on a floating dock the stability of the ship must also be taken into consideration and I, GB, V and Σi of the equation are the combined expressions for ship and floating dock.

It will be seen that a vessel like a floating dock rising and falling during docking operation has its I, V, GB, and Σi constantly changing so that its stability also constantly changes and must be carefully watched. The stability, as a rule, is greatest when the deck of the pontoon is above water, and very much smaller when the side walls are deeply immersed for accommodating the ship, and is smallest when the ship just emerges from water. Data are available showing that for a floating dock large enough to lift a ship of 12,000 tons, the combined motacentric height of ship and dock varies from 16 feet when operations are commenced, to a minimum of 3 feet when the bottom of the ship just clears the water, and then to a maximum of 74 feet when the operation is complete. For any new design along orthodox lines, therefore, we only need to figure the metacentric height at this worst condition.

Calculation of Stability

Assume the worst condition of service, viz., a ship of 500 tons dead-weight is docking and the ship is just emerging from water. The amount of water still remaining in pontoon is 1337—(500+735) =102 tons, and may be assumed to be in the four end compartments 2 feet deep. The water plane will be a horizontal section through the two side walls, and I will be $_{\circ} + Ay^2$, the symbols having the usual meanings.

$$I = I_{\circ} + Ay^2 = \frac{1}{12} Ah^2 + Ay^2 = 2A \left\{ \frac{h^2}{12} + ye \right\}$$

Here A=8′×122′; h=8′ y=22′ Substituting these values into the equation,

$$I = 2 \times 8 \times 122 \left\{ \frac{8^2}{12} + 22^2 \right\} = 1956 \times 489.3 = 980,000 \text{ ft.}^4$$

$$\Sigma i \times 4 \left\{ \frac{25 \times 36 \times 25^2}{12} \right\} = 187,500 \text{ ft.}^4$$

$$I - \Sigma i = 980,000 - 187,500 = 792,500 \text{ ft.}^4$$

Assume a combined centre of gravity of ship and dock to be 2 feet above, and centre of buoyance 3.8 feet below the top of the pontoon. Then GB=5.8′

$$GM = (I - \Sigma i - GB = V)/V = \frac{792,500 - 5.8 \times 48,000}{48,000}$$

$$= \frac{792,500 - 278,000}{48,000} = \frac{514,500}{48,000} = 10.7 \text{ feet.}$$

This high stability even at this worst condition is explained by :

(1) The low centre of gravity of the dock on account of the wooden side wall planking and heavy concrete pontoon.

(2) The low centre of gravity of this type of ship common on this part of Yangtze, which demands shallow draft, broad beam, heavy propelling machinery.

(3) The low combined centre of gravity of dock and ship.

(4) The ample width of the dock itself.

Economics of the Structure

There remains the question of economy of the structure. As stated at the beginning of this paper, the dock has been designed with a view to economy. An ideal structure of this type, from the point of view of strength, would be constructed entirely of steel, but the cost will be prohibitive. Since the undertaking is new without precedent to follow, investors will hesitate to sink in large sums of money. The writer has been repeatedly told that a first class repair yard with a floating dock cannot be got up for less than 300,000 taels. This is a very big sum in this part of the world, and its mere mention cools the enthusiasm and stifles the thought of any man who may be contemplating such undertaking. The writer's views are, however, different, and he believes that where the best cannot be had, the second best should always be encouraged and prosecuted and where investors are skeptical and yet the demand for a new project is insistent, a plan requiring the least amount of money should always be adopted. This explains the selection of reinforced concrete as the main material of construction, and timber, for the planking of the side walls. The latter is used partly to correct the unusual heavy weight of the reinforced concrete and partly to substitute the form timber for the bottom of the pontoon, always remembering that the cost of wooden form in reinforced concrete construction is a big item. There is no objection to the use of timber on side walls, because it is nearly all the time above water and is therefore not subject to the deleterious effects thereof, and when damaged can be easily repaired. A complete wooden structure, however, cannot be safely recommended apart from the high initial cost, owing to the difficulty of making joints in timber, and the lack of experienced builders to construct it. Such structures have long become obsolete.

The estimates of cost of material and labor have been made to the smallest item, and has been found to be $14,800 for material and $2,200 for labor, totaling $17,000. This does not include cost for pumping and mooring equipments. If 10 per cent. is allowed for incidentals, then the above figure becomes $18,700. The following unit prices have been assumed (July, 1925); all being in Mexican dollars, the material delivered at Tayeh.

Material	*Description*	*Unit Price*
Portland Cement*		4.78 per bbl.
Yellow sand	Coarse granules	3.30 per 100 cu. ft.
Gravel	not over 1" size	4.00 ,,
Steel Bars*	Corrugated	100.00 per long ton
Steel wire*	1/10" diam.	0.15 per lb.
Oregon pine board*	2" thick	20.00 per 100 sq. ft.
,, ,, beams*	8"×10"	70.00 per 100 ft.
,, ,, ,,	4"×4"	15.00 ,,
,, ,, ,,	5"×10"	44.00 ,,
Big Chinese Firs	Circ.=2 Chinese ft.	10.00 per pc.
Small ,, ,,	,, =1.3 ,, ,,	1.20 ,, ,,
Small Pine sticks		0.30 ,, ,,
Wire Nails	2" to 5" long	10.00 per 100 lb.
Square nails	6" long	10.00 ,,
Bolts and Nuts	¾" dia, 24", 20", 16" long	0.35 per pc.
Hemp	Low grade	0.15 per lb.
Wood Oil		0.30 ,,
Heavy Wood Oil		0.40 ,,
Coal Tar		0.05 ,,

Items with an asterik (*) cannot be obtained locally at Ichang and a percentage might have to be added to the above prices which were ruling at Tayeh. Such increase in cost has already been allowed for under " incidentals."

It must be noted, however, that the total cost of $18,700 does not include fees to the naval architect, profit to the contractor, and expenses chargeable to supervision.

Recapitulation

(1) The number of steamers on the Upper Yangtze is growing rapidly. (2) There is a demand for a repair shipyard which, as a condition precedent, must have a floating dock. (3) Such a dock should be located in Ichang. (4) A reinforced concrete floating dock of 600 tons lifting capacity can be constructed at a cost of about Mex. $20,000. (5) The design as submitted possesses ample stability and strength.

Gold Placers in Yalungkiang Valley, Szechwan

GOLD placers abound in the Yalungkiang Valley, Szechwan province. The river is also known as Chinkiang, meaning Gold River, on account of its gold. These placers occur in the neighborhood of Wahli on the west of the Yalungkiang, some 300 li north of Yenyuan. The journey from Wahli to the Yalungkiang takes five or six days by the highway via Yenyuan, and to Hwaili, about the same number of days by a narrow path.

The deposit is said to have been discovered some time in the Ming dynasty (1368-1643) by Mu Tien Wang, chief of the aboriginal tribe, Kwa Pieh Tu Sze, who were driven to this part of Szechwan from Yunnan province by the Chinese. The deposit was handed down to the descendants of Mu Tien Wang. It soon attracted the Chinese in the neighborhood, however, and they swarmed into the district to seek the hidden treasure. Their increasing number brought them into conflict with the tribal chief and many of them were ejected by force. The mines then became a monopoly of the aborigines and were barred to Chinese workers. But in 1898, after an official investigation, the Manchus made an arrangement with the aborigines to permit Chinese miners to work the placers by paying the tribal chief 10 per cent. of the government tax on the gold produced. Aside from the government arrangement, the chief's promise to throw the mines open to Chinese, through the counsel of one of his Chinese friends, made all Chinese feel safe in venturing into the enterprise. The Manchu government then established a gold mining administration and issued three kinds of licenses to Chinese workers: (1) licenses on new pits, at Tls. 3 each; (2) licenses on auxiliary pits, at Tls. 2 each; and (3) licenses for working on abandoned pits or small sluices in the valleys, at Tl. 1 each. In 1898, the Chinese miners were required to supply the aborigines with 500 catties of table salt a month, the cost of which was to be deducted from the government tax on the gold produced. Later, in view of the difficulty in transporting salt, a tax of Tls. 20 a month was levied on the Chinese miners, the amount to be advanced to the aborigines by the government.

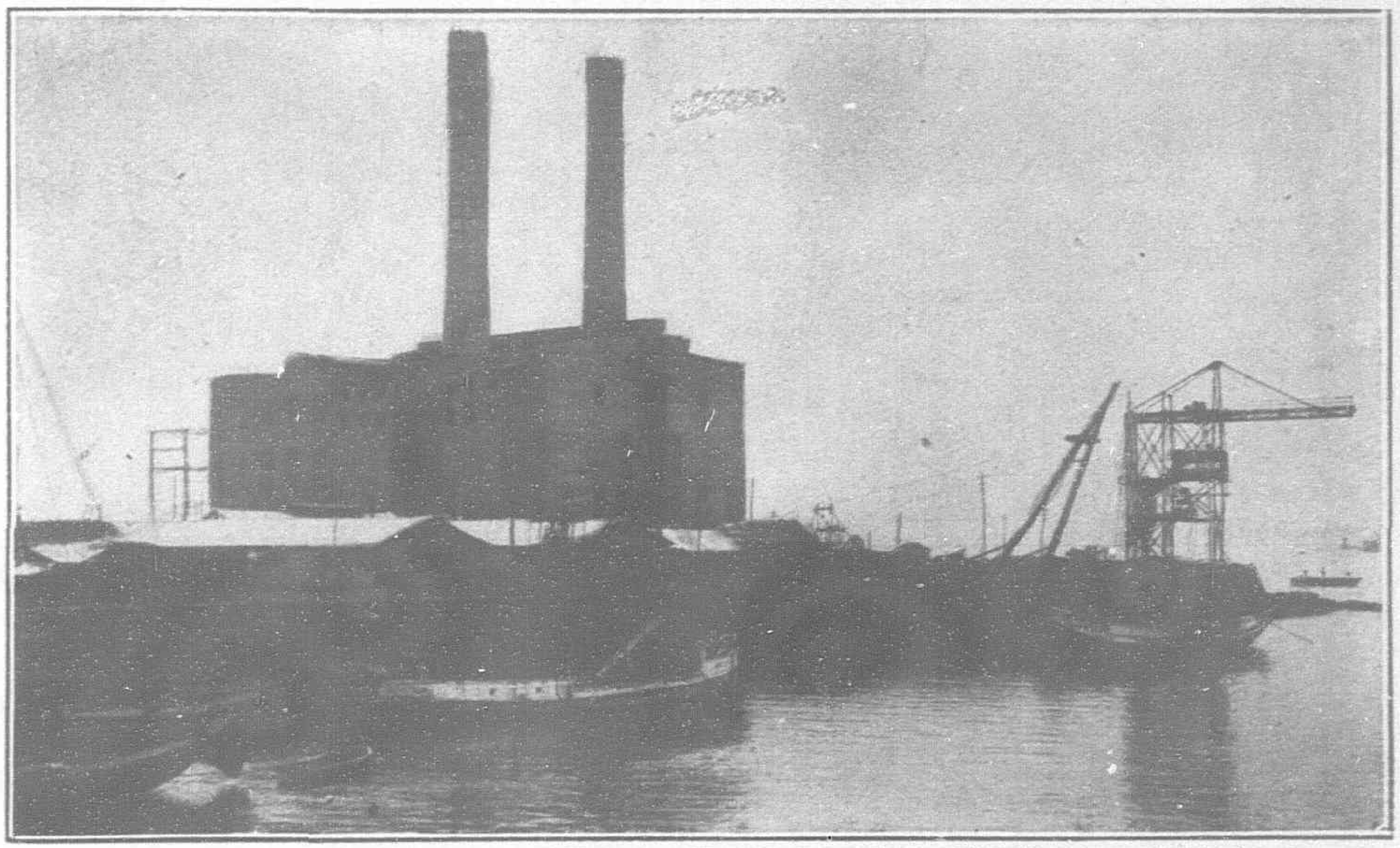
In 1898 and immediately afterwards, the working was very prosperous. The output of gold amounted to ten thousand ounces a year, the largest nuggets weighing several catties. At present, there are over a hundred license holders in Wahli, of whom about forty are for new pits, about fifty for auxiliary pits, and the remainder for working on abandoned pits or washing on a small scale. As a rule, these miners have only a meagre capital and use very simple tools. They constitute 60 per cent. of the population of Wahli, the rest being traders, peddlers, and unemployed. Their mining right is transferable between individuals by private arrangement.

The hills on the river bank where the placers occur are generally 600 to 700 *chih* high, the strata dipping southeast at an angle of 60 degrees. The deposit is alluvial and bears no relation to the native rock. The deposit is richest in depressions or sometimes in rock fissures.

The pits are of irregular shape, varying degrees of inclination, different size, with winding paths. The rock in the pit is dug out with chisel and hammer, or dynamited. The gold sand is conveyed to the pit-mouth by carriers in bamboo baskets of 40 to 50 catties capacity. Each carrier can carry on his back 15 or 20 of these loaded baskets a day. The output is divided into three kinds: (1) *Cheng Sha* principal output of gold sand, which goes to the mine owner: (2) *Show Sha*, subsidiary output which goes to the carriers and diggers; and (3) *Tang Sha*, gold sand precipitated in water outside the wash-tub. The *Cheng Sha* accumulated on the pit-mouth is washed once every 10 or 15 days. Conglomerate or rock debris is first picked out before the sand is ready for washing. Tree trunks cut into halves of five or six *chih* in length with the center hollowed out are used as tanks in which gold sand is washed. The such tanks are joined together and arranged to a gradual slope of about 10 degrees. The sorted gold sand is then put into the tanks, and running water from the river is allowed to flow over it, washing away rock particles and barren sand and leaving gold grains and heavy gold-bearing sand at the bottom. The final contents in the tanks are removed to wash-tubs of a boat shape and washed in a pool. Gold particles remain at the bottom of these tubs after washing. *Show Sha* is washed in a pool without any preliminary washing in tanks, but *Tang Sha* is treated in the same manner as *Cheng Sha*. The carriers, diggers, and other hands are paid seven dollar cents for a day's work, as payment for food, plus a half of the output from *Show Sha* consisting of particles below 0.08 oz. in weight, or 20 per cent. of the output for particles above 0.08 oz. in weight, the remaining portion being distributed as follows: 20 per cent. to the mine-owner, 30 per cent. for tax to the government, and 30 per cent. to be used for expenses. Apart from license fee, the government taxes the new pits and branch pits at 30 per cent. of the gold particles from *Cheng Sha* and *Tang Sha* above 0.01 oz. in weight and from *Show Sha* particles above 0.08 oz. in weight, and for workings on abandoned pits, a monthly payment of 0.06 oz. of placer gold. During a prosperous season, the government may be able to collect 500 or 600 ounces of gold. The mine hands work by shifts of four hours each, both day and night, there being two day shifts and two night shifts. Water is expelled by draining and pumping. The washers are watched by inspectors and policemen, and workmen leaving the pit or the office are closely examined and sometimes searched.

Gold placers also abound in the neighborhood of Wahli, namely, in Chintungtze, about 20 li off, Chinniutaitze, about 10 li off, Shapingtze, Hungyentze, Alitaitze, Sinkow, Tokow, Meitzeping, and other localities.

The New Toho Plant at Nagoya



View of Nagoya Station of Toho Electric Power Co.—1-35,000 kilowatt, 43,750 k.v.a. G.-E. Steam Turbo Generator Installed and Operating Second Unit now in process of erection

THE new plant of the Toho Nagoya Electric Power Company which was recently opened at Nagoya, contains, the largest machine that has ever been exported from any country, and the work was undertaken by the Toho engineers in the face of many doubts amongst the engineering fraternity in Japan as to the possibility of shipping such a large machine overseas and handling it at its destination and satisfactorily installing it in the plant. In the interest of economy however, the Toho engineers persevered in their efforts and the result is the installation of the No. 1 unit.

This station was intended by the Toho Company to act partly to supplement the hydro-electric power generated in their system and partly to provide primary power for Nagoya district. Due to the universal development of hydro-electric power in Japan, it is becoming more and more costly to carry out new hydro-developments because available sites now are more remote from load centers and in more inaccessible regions and require an increasingly large amount of civil engineering work. For these reasons many engineers in Japan now consider that large steam power plants offer a more economical means of power generation than the water power sites now available. Furthermore, a steam plant can be operated twelve months in the year whereas under ordinary conditions the hydro electric plants run at greatly reduced capacity during the winter on account of water shortage.

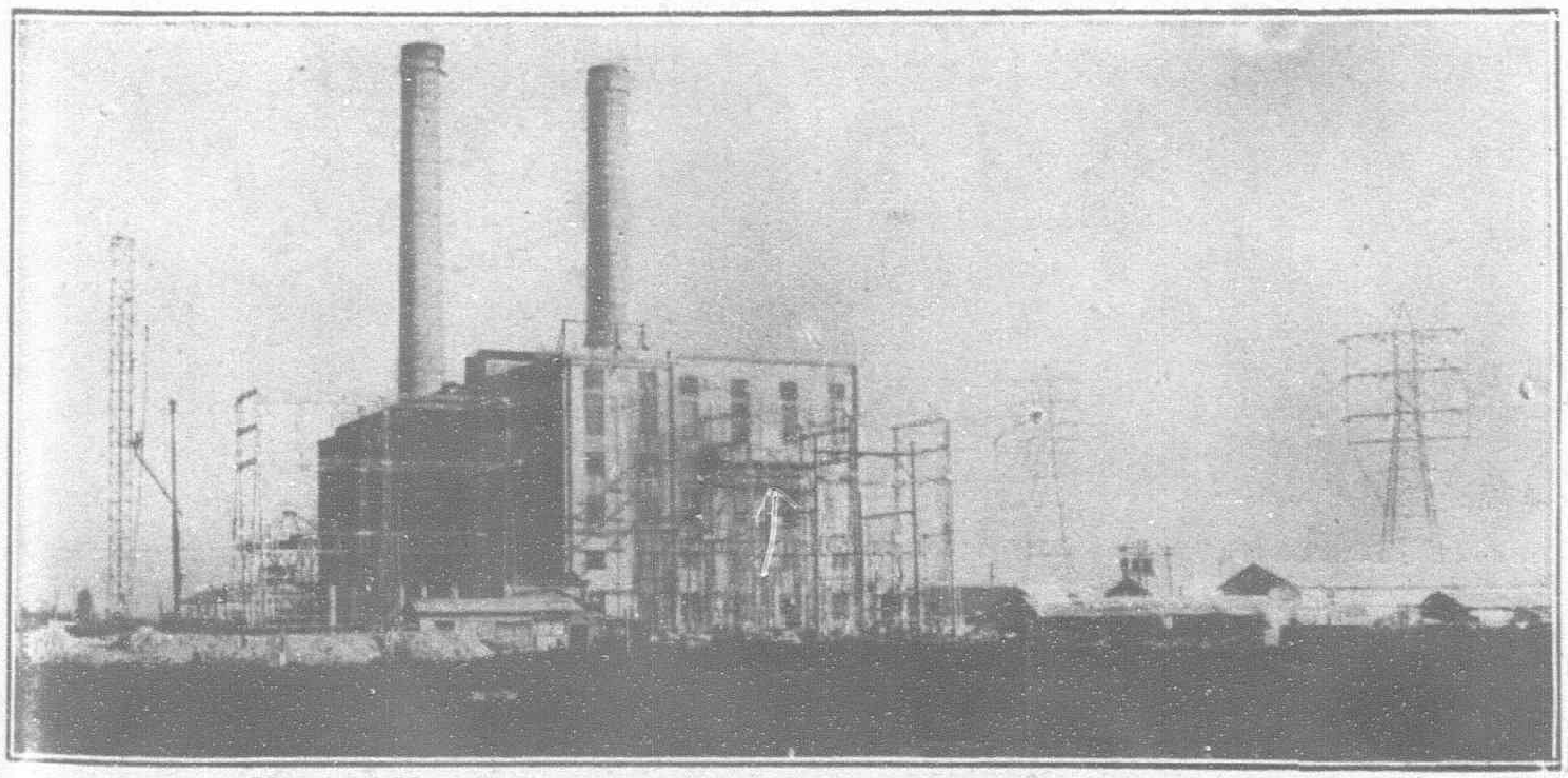
The plan of erecting the station was made late in 1923. The ceremony of purging the ground where the plant was to be erected was conducted on June 2, 1924. The foundation work was completed on April 12, 1925. The work of installing boilers and machinery was completed on October 29 of the same year. The official inspection by the experts of the Department of Communications was passed satisfactorily and sanction was given by the Department for the operation of the plant. It took about 17 months, 515, days, before the entire work was completed. The number of persons engaged in the work was 118,194.

The construction expenses for plant amounted to Y.5,116,435. An extension is to be made in future in the equipments of plant. This success was achieved, I believe, through your supports and good machinery and the excellent work of those who were concerned in it. I am ever grateful for these.

A synopsis of the plant and its equipment is given here—

1.—GROUND.

Power plant proper	approx.	365,100 sq. ft.
Employees' Living Quarter	,,	69,620 sq. ft.
Total		434,720 sq. ft.



View of New Nagoya Station showing 77,000 V Feeder Getaway

2.—POWER PLANT BUILDING.

(*a*) Space occupied by :—

Switch Room etc.	approx.	3,195 sq. ft.
Generator Room	,,	5,312 sq. ft.
Boiler Room	,,	14,283 sq. ft.
Total space occupied by plant	approx.	22,790 sq. ft.
(*b*) Total floor space	,,	59,170 sq. ft.
(*c*) Height of roof at,		
Eaves		76 ft.
Ridge		91 ft.

3.—BOILERS AND ACCESSORIES.

(*a*) Boiler.

Type	Cross marine
Heating Surface	18,611 sq. ft.
Capacity (Max. for 3 hours)	162,000 lbs. of steam per hour.

(One unit is capable of developing 15,000 k.w.)

Steam Pressure	350 lbs. per sq. inch.
Number of boiler	4 units.
Steel tubes per unit	1,020 seamless steel tubes, each having a length of 18 ft. and outside diameter of 4 inches.

(*b*) Stoker (Mechanical).

Triple compartment type stoker per unit.

Each compartment is 9 ft. × 20 ft.

Total grate area	540 sq. ft.

(*c*) Superheater (264 weldless steel tubes, each having 1—½ inches of outside diameter).

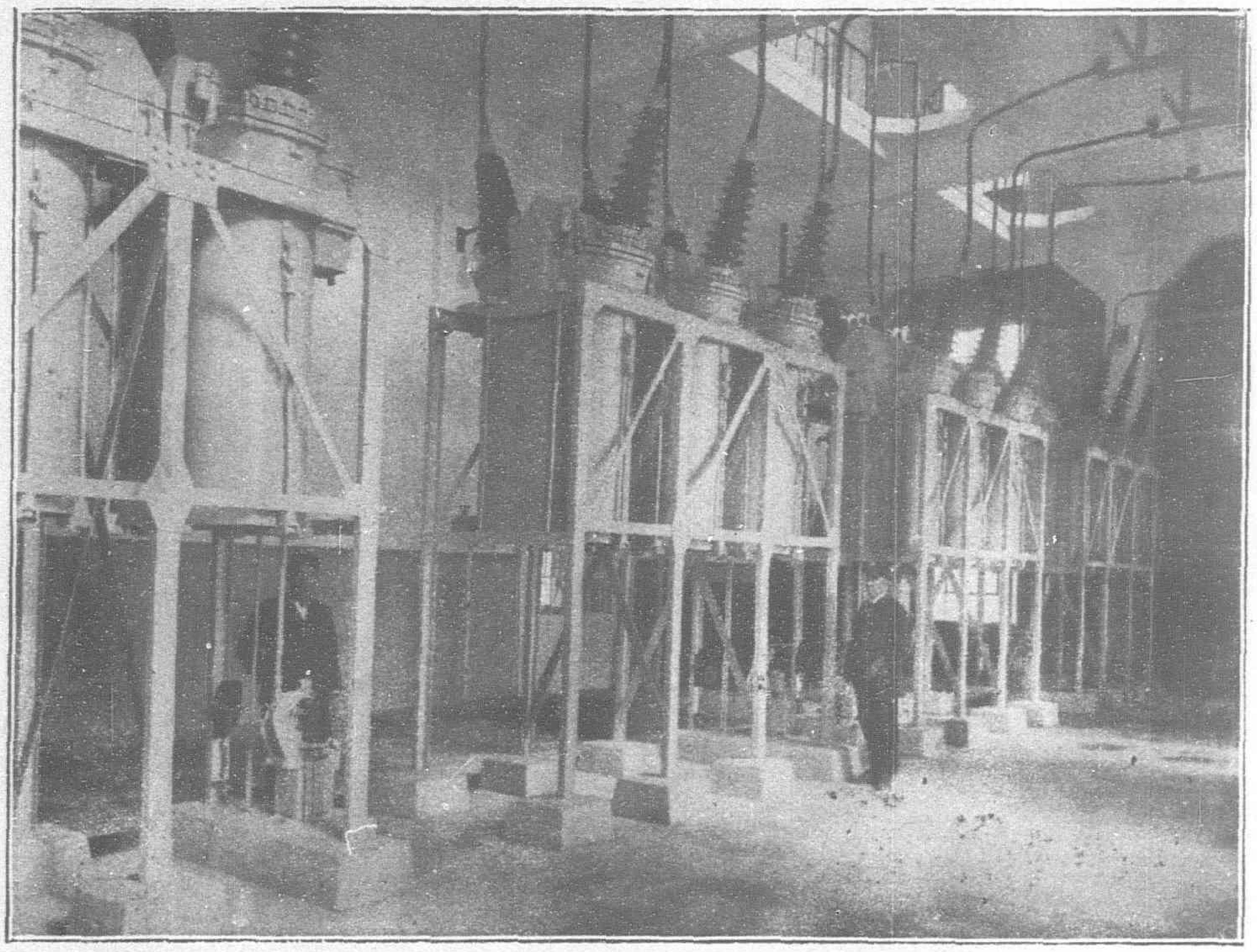
Superheating surface	4,730 sq. ft.
Superheat	300 deg. F.

(Final Temperature 735 deg. F.)

(*d*) Induced draft fans.

Type	Centrifugal.
Number of Fans per unit of boiler	2
Capacity of one fan	118,400 cubic ft. of air per minute.

Each Fan is connected to 122 h.p. induction motor.



High Tension Switchgear, 77,000 V. Built by Shibama Engine Works, Japan

(*e*) Forced draft Fans.

Type	Double inlet with multivane runner.
Number of Fans per unit of boiler	2
Capacity of each fan	51,00 cubic ft. of air per minute.

Each fan is connected to 65 h.p. induction motor.

(*f*) Feed water equipment.
Three feed water pumps, each having a capacity of 416 gallons of water per minute, and connected to 175 h.p. motor.

(*g*) 4-Greens cast iron economizers, each having 8,870 sq. ft. of heating surface.

(*h*) Total weight of 4 units of boilers 2,100 tons:

4.—STEAM TURBO-GENERATOR.

Steam pressure at throttle	315 lbs. per sq. in.
Speed	1,800 r.p.m.
Steam Consumption	9.8 lbs. per k.w.h.
Voltage of Generator	11,000 volts.
Capacity (43,750 k.v.a.)	35,000 k.w.
Weight of the set	288 (English) tons
Number of unit	1 (at present)

(Second unit will be ready for operation by the fall of 1926).

One set of air cooler for generator.

Manufacturer—General Electric Co. of America.

5.—CONDENSER AND ACCESSORIES.

Manufacturer—W.H. Allen, Sons & Co. (British).

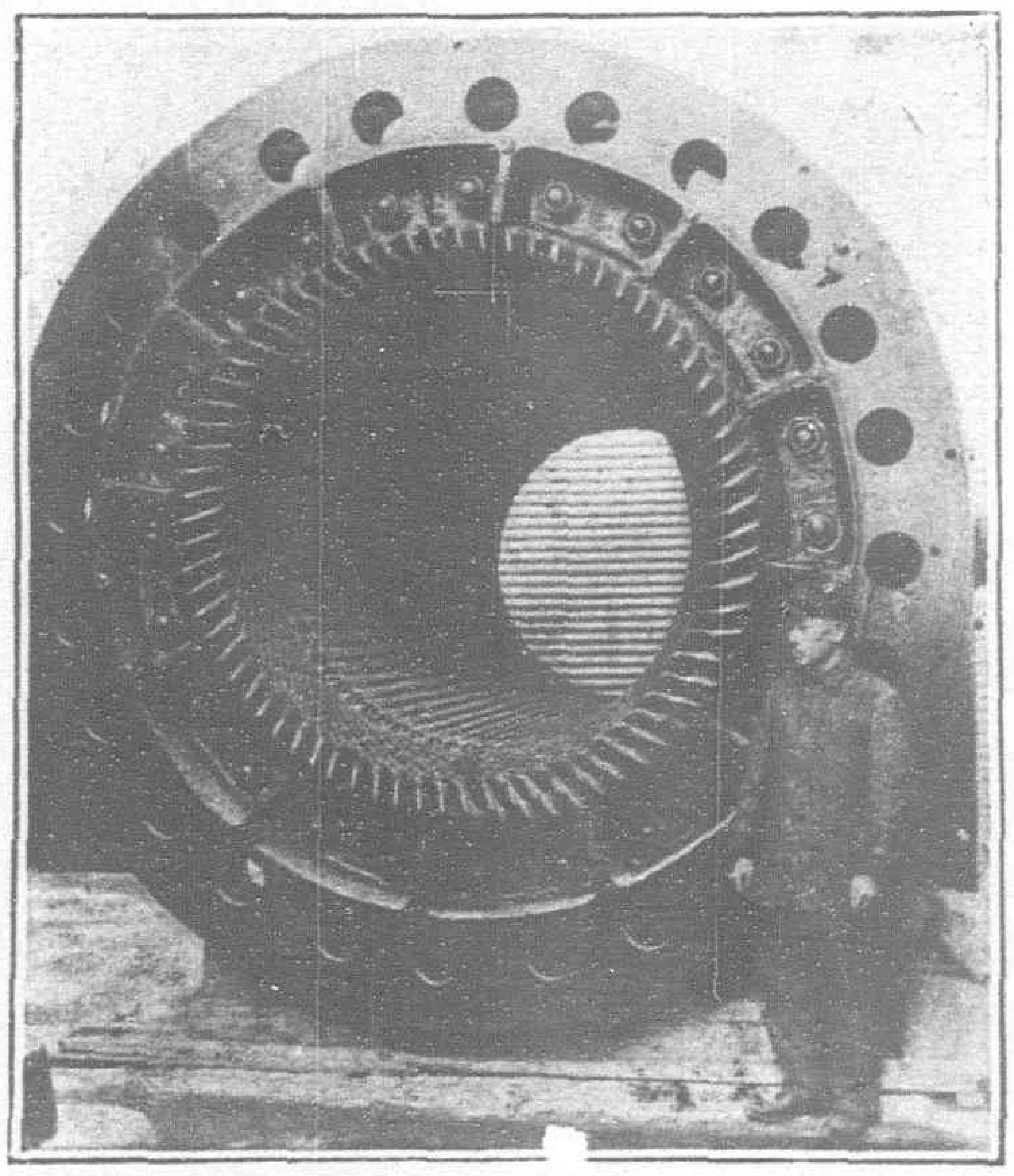
(*a*) Condenser.

Cooling surface	45,000 sq. ft.
Capacity	365,000 lbs. of steam per hour.
Vacuum	28.5 inches.

Quantity of cooling water required 50,000 English gallons per minute.

Weight	160 tons.

(*b*) Circulating pumps. 2-pumps per condenser, each being connected to 470 h.p. motor and capable of pumping 25,750 gallons of water per minute.



Generator Section for 4/3,750 k.v.a. Generator Shipped Disassembled. Assembled and Wound at the Site by G.-E. Winders sent out from Schenectady

(*c*) 2-Condensate Extraction and Feed Delivery pumps, each being connected to 70 h.p. motor.

(*d*) 2-Kinetic Rotary air pumps, each being connected to 55 h.p. motor.

6.—FEED WATER HEATING EQUIPMENT.
Manufacturer—W. H. Allen, Sons & Co.

(*a*) One evaporator.

Type	Low pressure flash evaporator.
Capacity	21,000 lbs. of water per hour.
Heating surface	1,000 sq. ft.
Temperature	170 deg. F.
Additional Heating surface	200 sq. ft.
Number of motors connected	2

(*b*) Feed water heater.
First and second stage heaters.
Heating surface per stage 1,300 sq. ft.
Temperature of Feed Water.

First stage.	Inlet temperature	95 deg. F.
	Outlet ,,	150 deg. F.
Second stage.	Inlet ,,	150 deg. F.
	Outlet ,,	210 deg. F.

Steam for Heating Feed Water.
Steam for feed water heating is extracted from 12th and 14th stage of the Main Turbine and evaporator.

7.—HOUSE TURBO-GENERATOR SET.

Number of Unit	1
Capacity	1,000 k.w.
Speed	3,600 r.p.m.
Voltage	3,300 volts.
Manufacturer	G.E. Co. of America.

This unit will run idle for the normal condition and will take up the station load in case of emergency.

8.—EXCITERS.

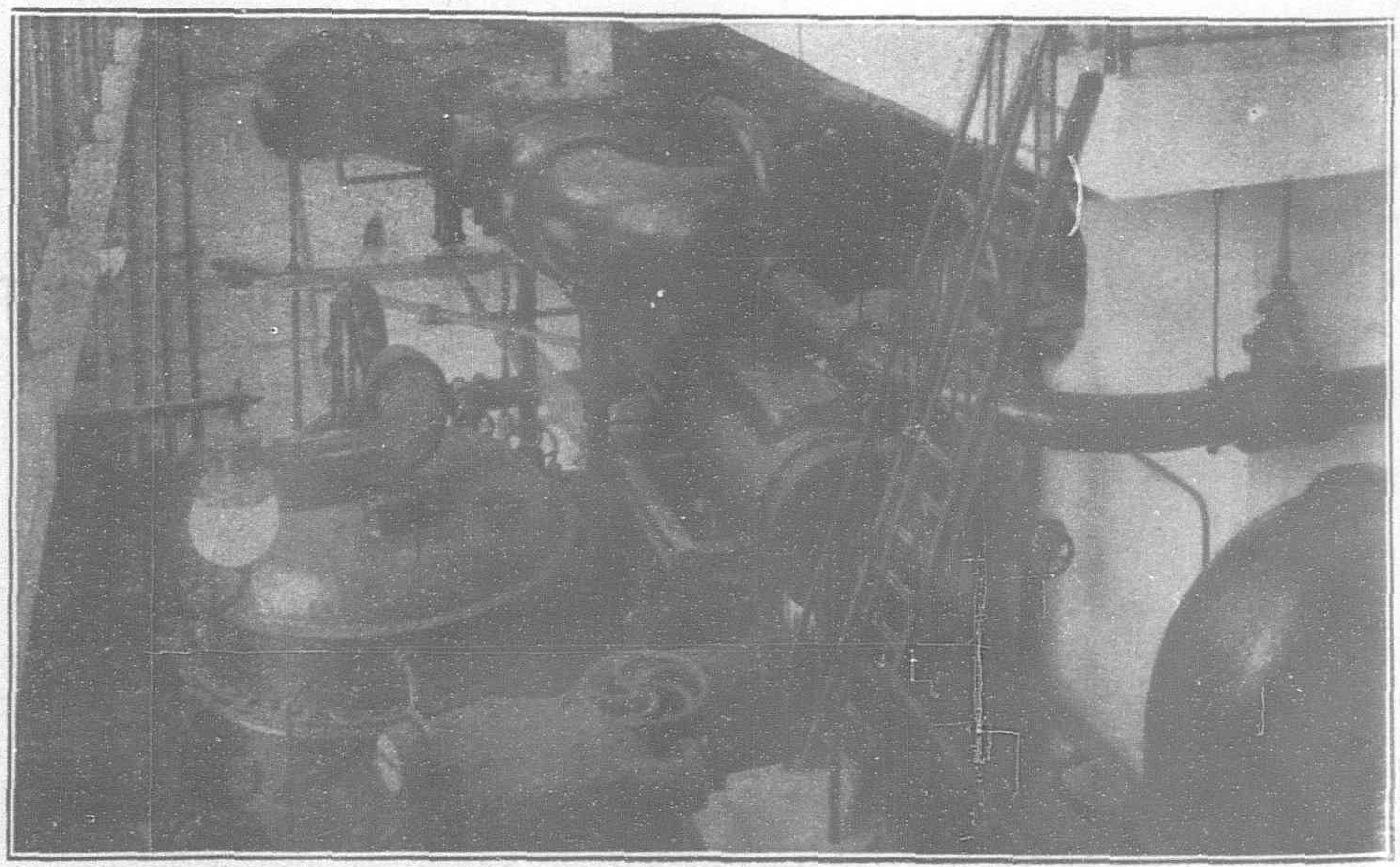
2—160 k.w. motor-generator sets for exciting the main generator.

One set is for reserve.

Manufacturer	G.E. Co. of America.

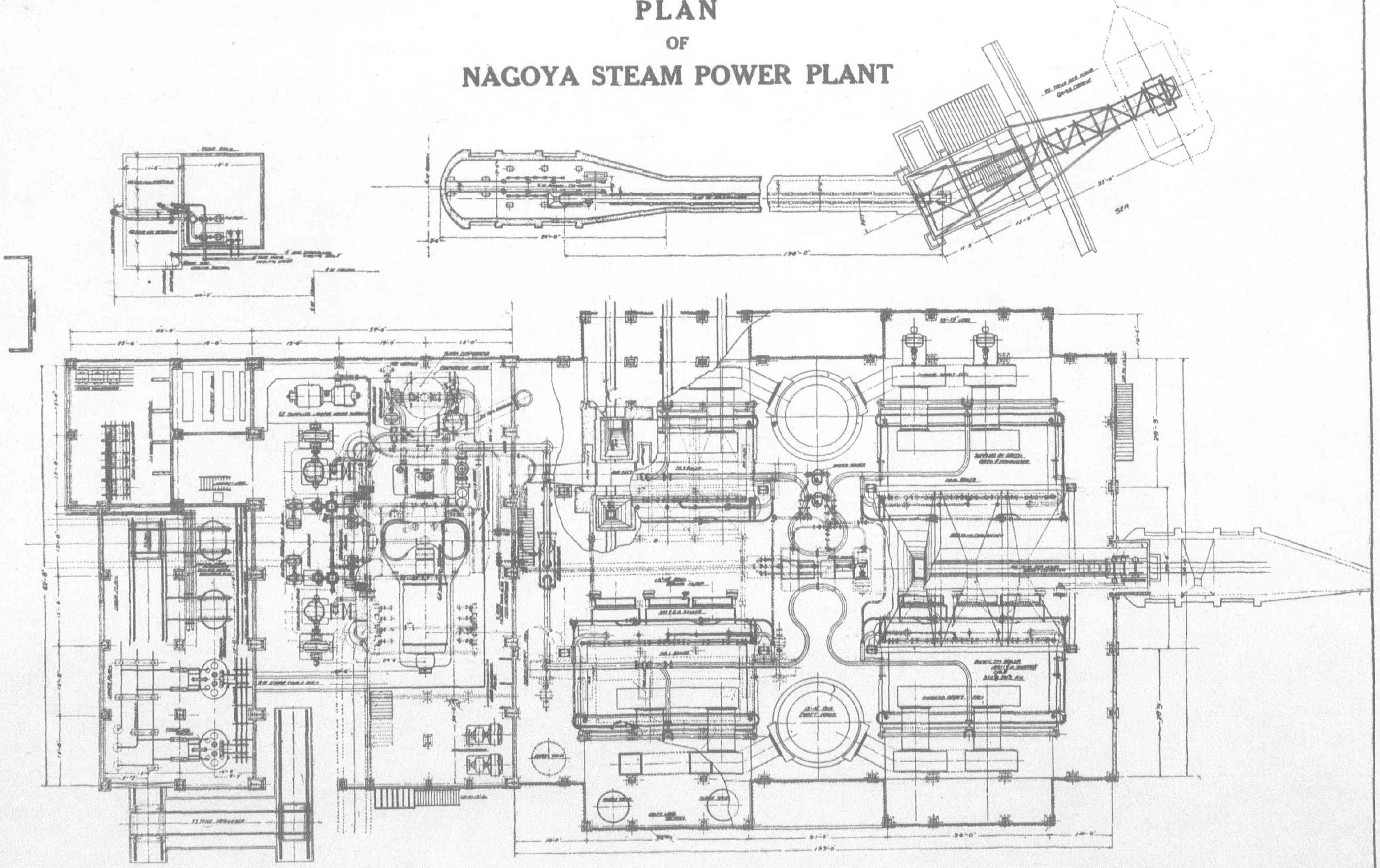
9.—COMPLETE SET OF SWITCHBOARD.

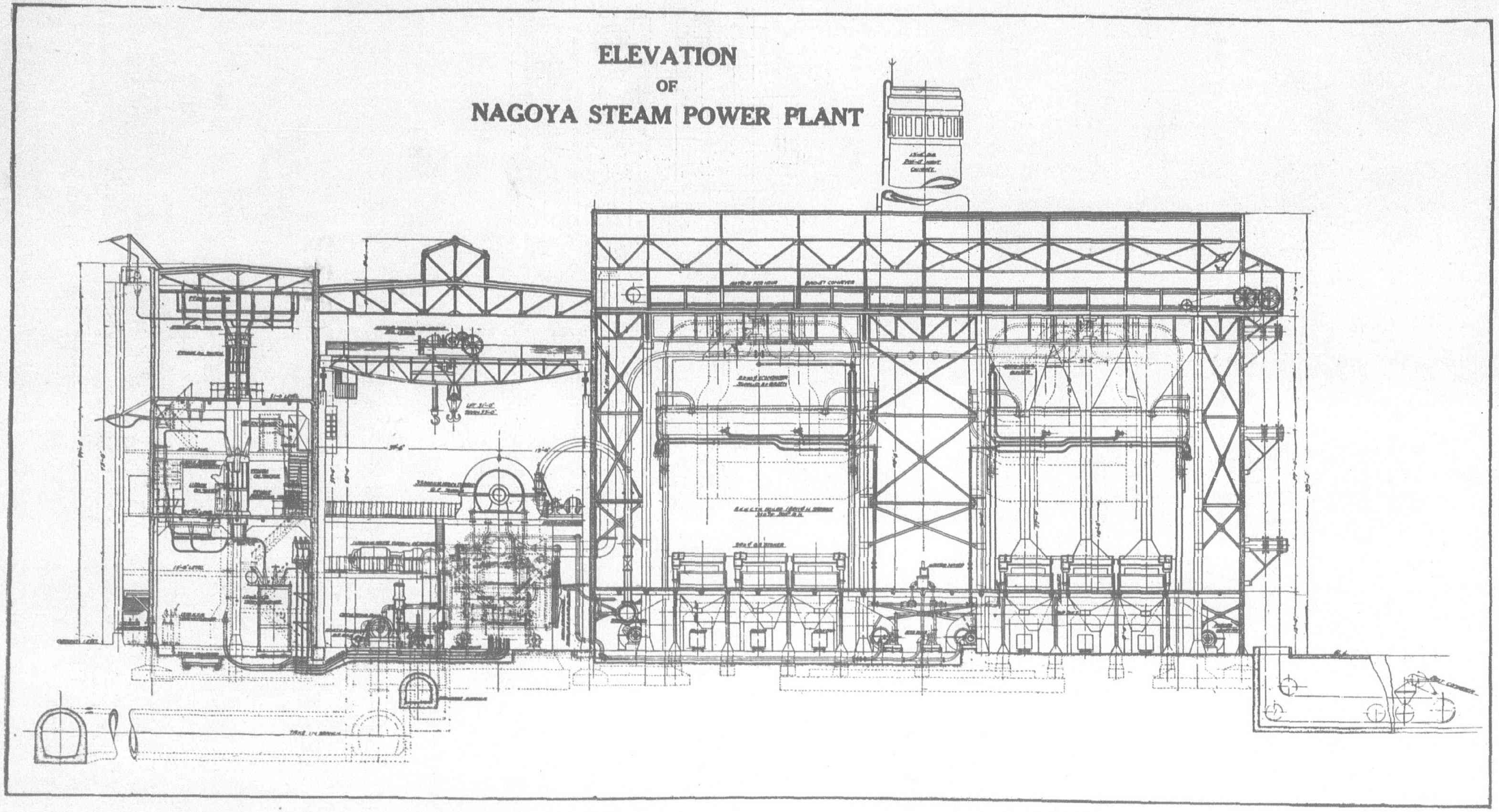
Manufacturer	G.E. Co. of America.



Feed Water Heaters and Evaporator—in Connection with Two-Stage Extraction from the Turbine. By W. H. Allen, Sons Co., Ltd., Bedford, England

PLAN
OF
NAGOYA STEAM POWER PLANT





ELEVATION OF NAGOYA STEAM POWER PLANT

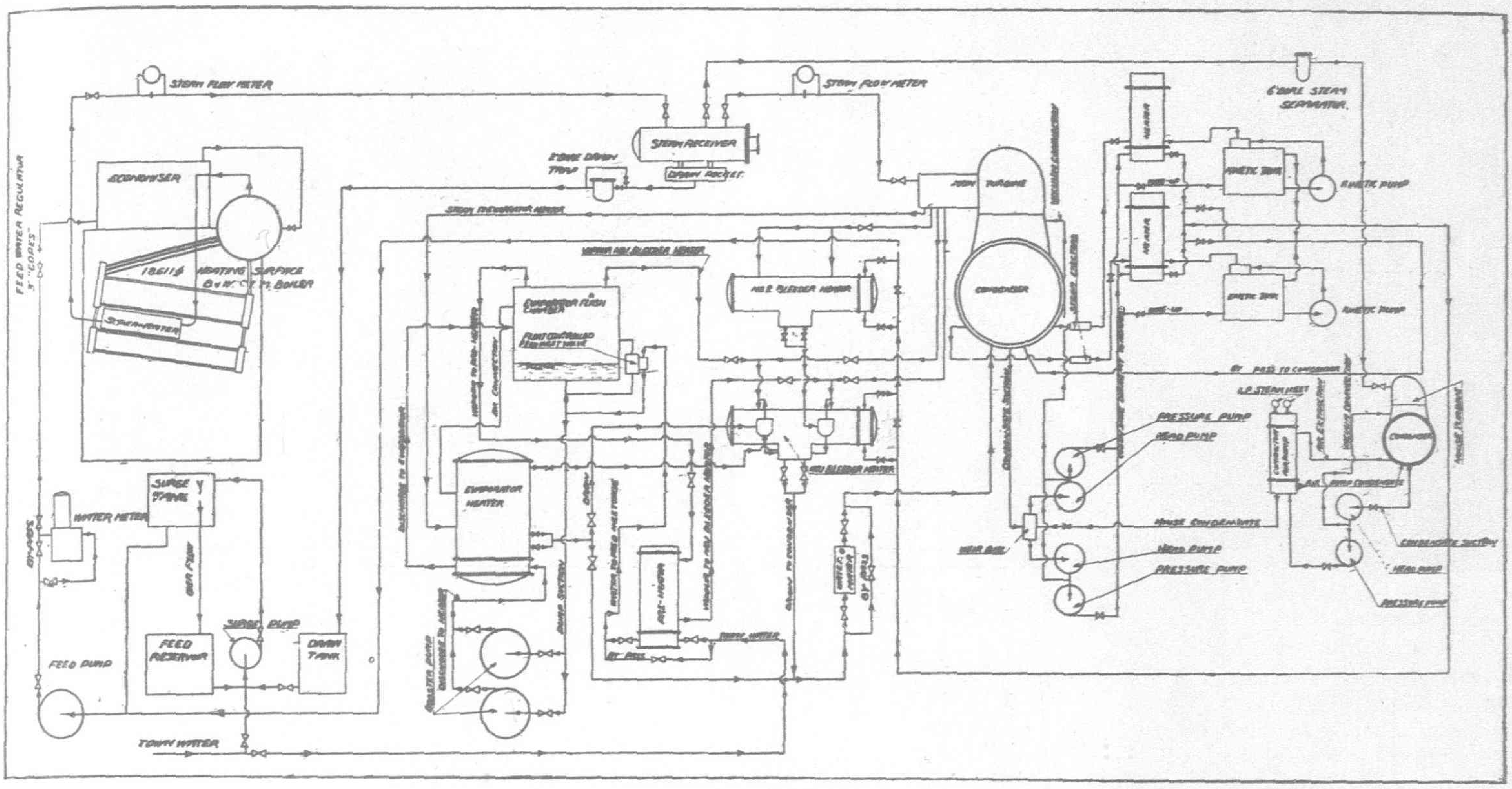


Diagram of Steam and Water System

10.—TRANSFORMERS.

(*a*) 4—15,000 k.v.a. single phase, 60 cycle, o.i.w.c. transformers, one for reserve.

Voltage	11,000/77,000 volt.
Manufacturer	Shibaura Engineering Works.

(*b*) 3—1,500 k.v.a. single phase, 60 cycle transformers for station service.

Voltage	11,000/3,300 volt
Manufacturer	Hitachi Mfg. Co.

(*c*) 3—150 k.v.a. single phase transformers for station lighting.

3—30 k.v.a. single phase transformers for station lighting.

All manufactured by Hitachi Mfg. Co.

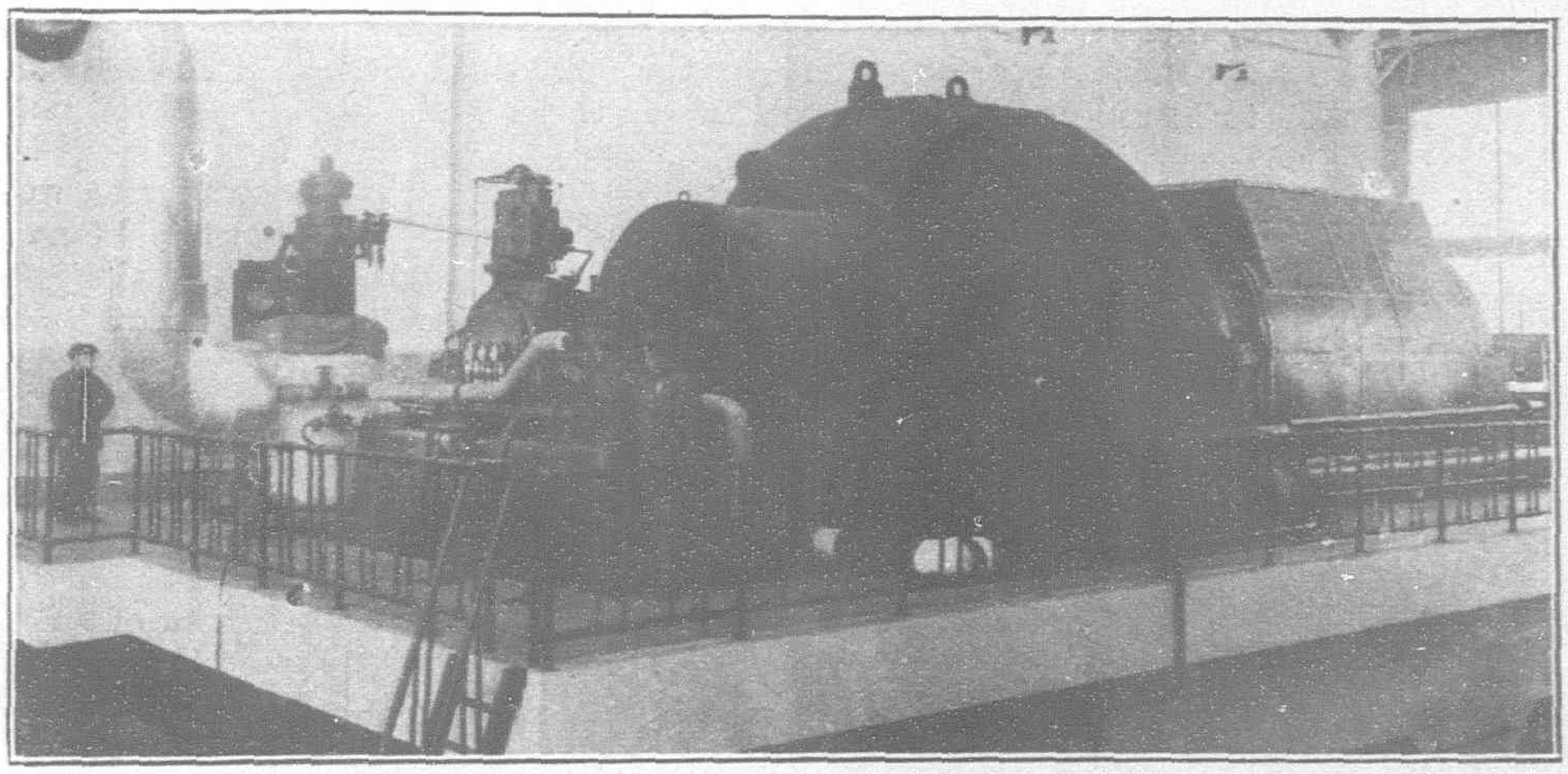
11.—MISCELLANEOUS EQUIPMENTS.

(*a*) 1—Travelling crane.

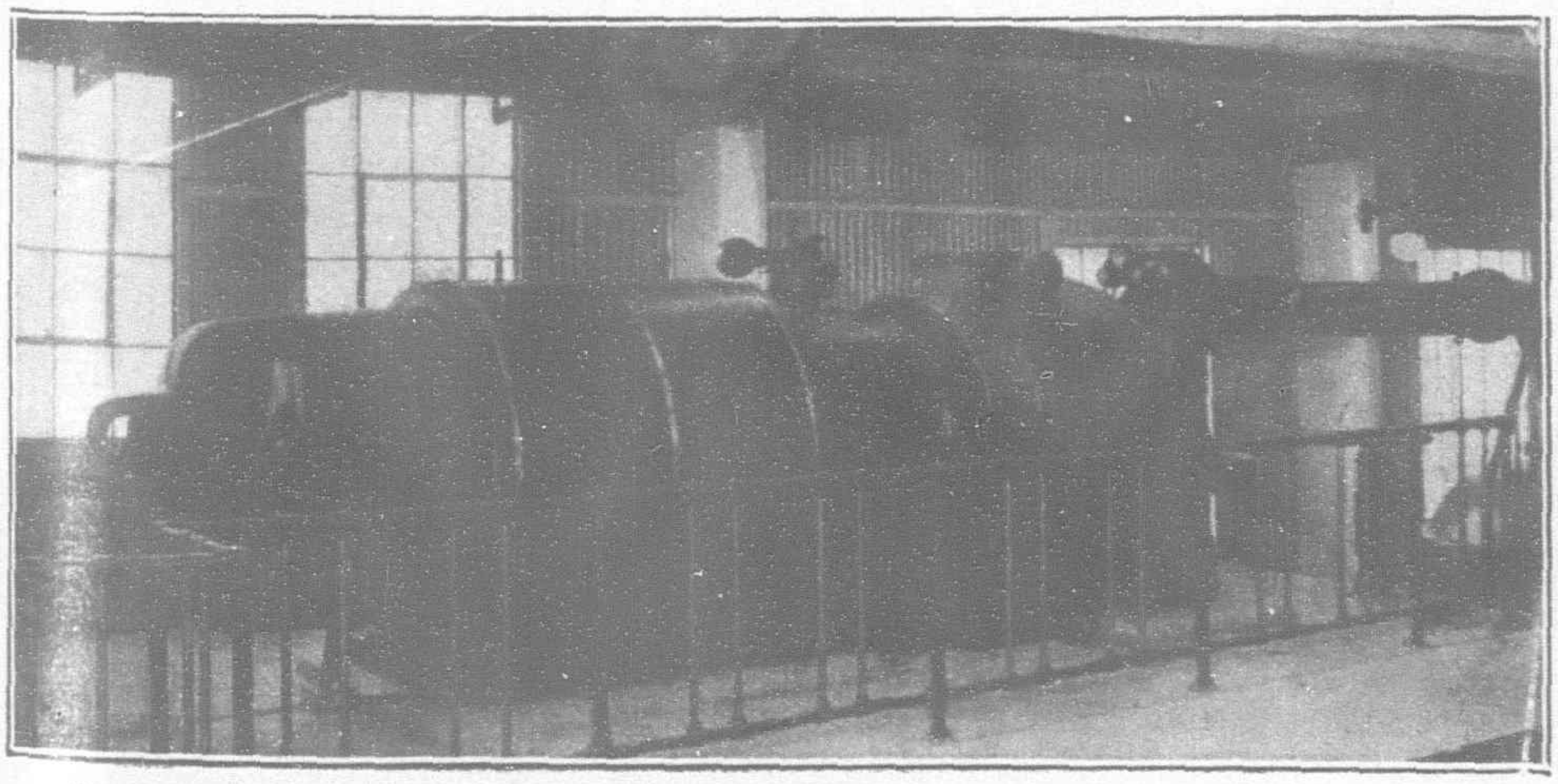
Capacity	65 tons and 15 tons.
Manufacturer	Hitachi Mfg. Co.

(*b*) Storage battery.

Number of cells	70.
Capacity	300 amper hours.
Manufacturer	Nippon Battery Mfg. Co.



Main Turbo-Alternator No. 1 Capacity 35,000 kilowatts; 43,750 k.v.a.; 11,000 V 30 30/60 cy.; 1,800 R.P.M. Single Casing. The largest Turbo-Generator ever Shipped Overseas, and largest in the Far East. Net Weight 325 Tons. In operation since November 15, 1925. By General Electric Co., U.S.A., erected in three months



House Turbo-Generator—General Electric 1,000 k.w.; 1,250 k.v.a.; 3,300 V 3 p.h.; 60 cycle unit. For Supplying Power to station Auxiliaries

(*c*) Coal Handling Equipments.

(a) Cram shell bucket.

Capacity	70 tons per hour.

(b) 1 set of belt and bucket conveyors.

(*d*) Coal Bunker.

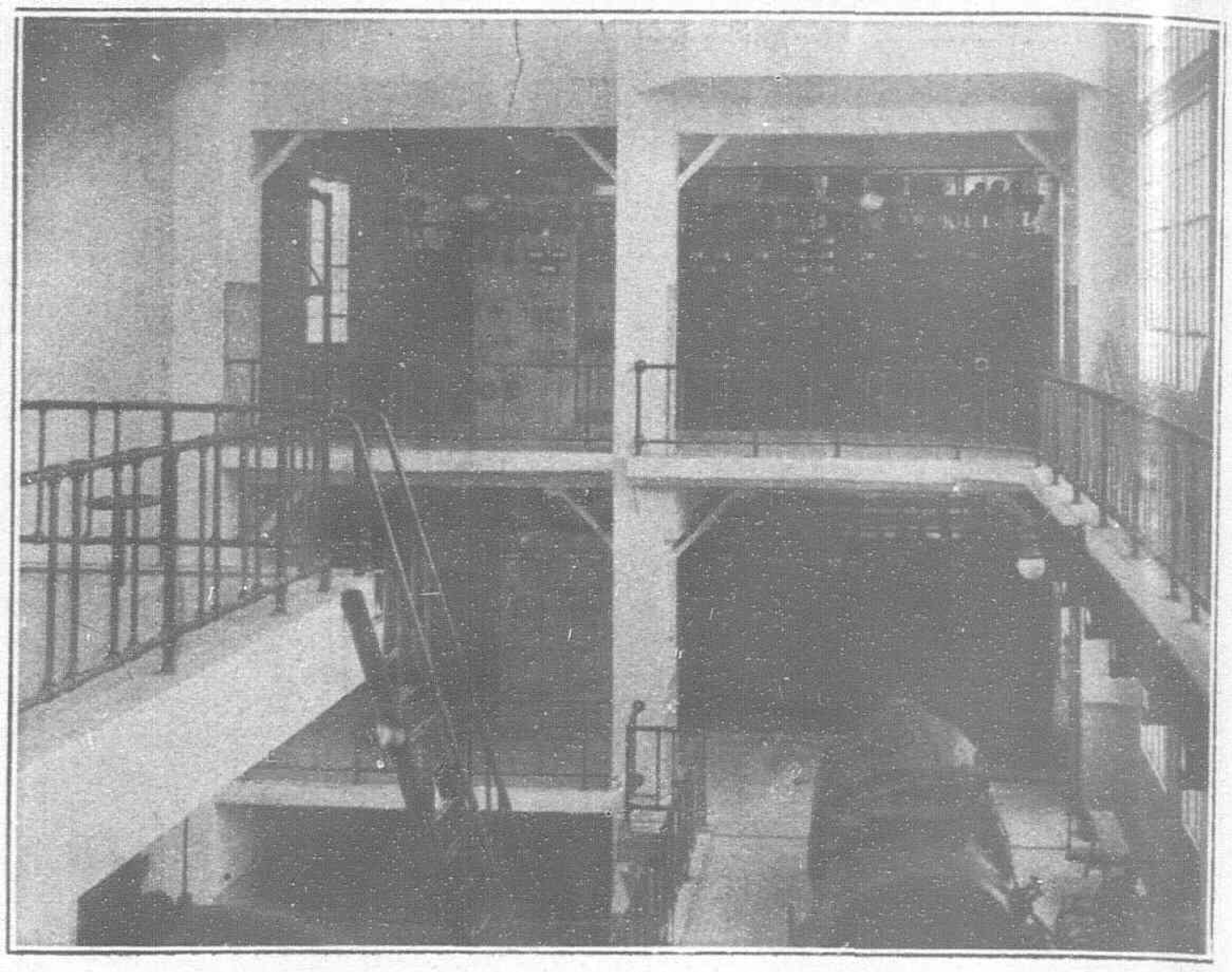
Capacity	Max. 800 tons. Normal 550 tons.

12.—2-STACKS (REINFORCED CONCRETE).

Height	200 ft.
Inside diameter at top	13 ft. 6 inches.
Outside diameter at bottom	20 ft. 1.5 inches.
Weight of each	2,000 tons.

In connection with two-stage steam extraction and the Allen, Sons & Co.'s feed water heating plant, an economy has been reached

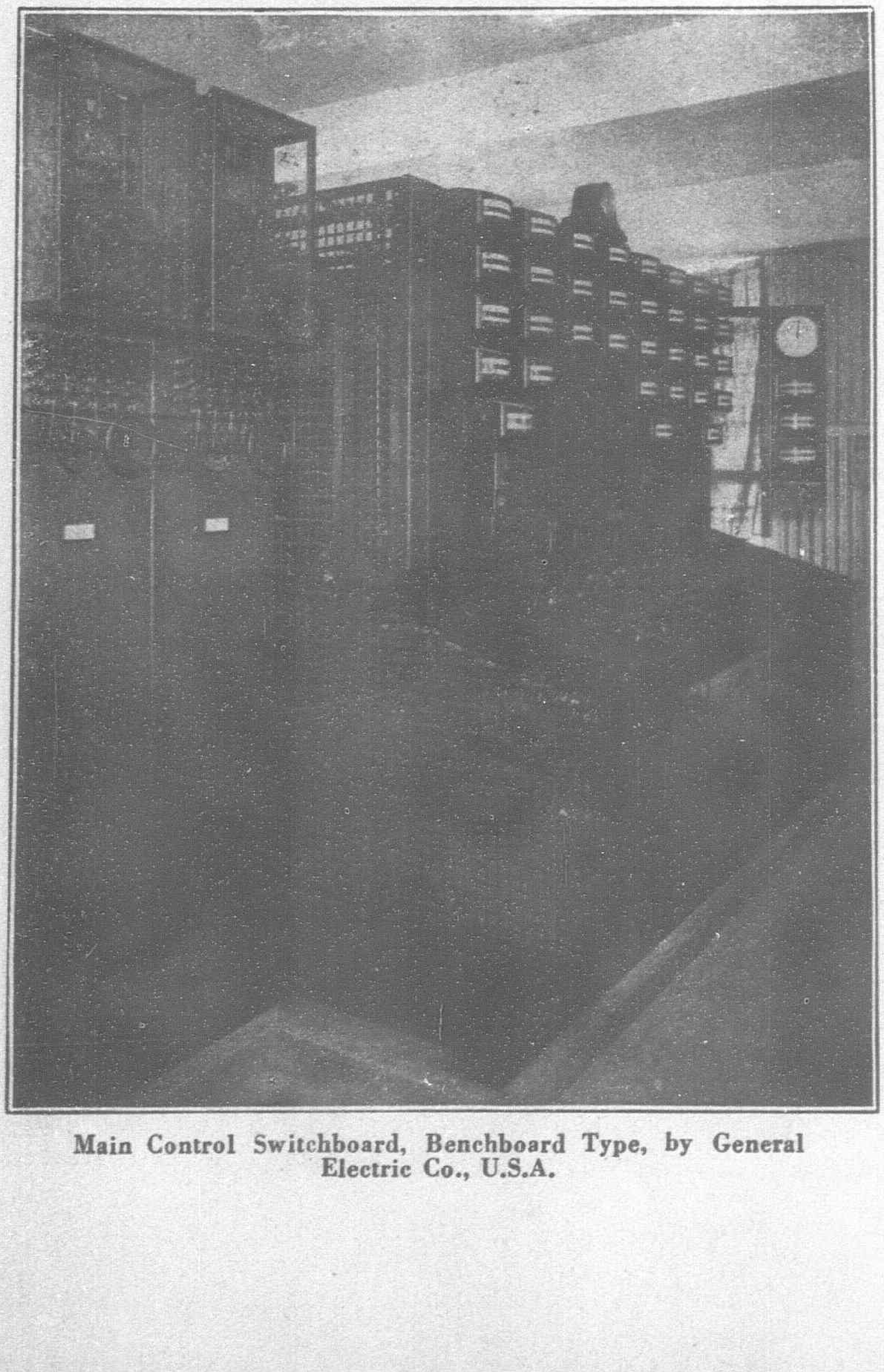
Main Step-up-Transformers each 15,000 k.v.a., 77,000/11,000 Volts. Built by Shibaura Engineering Works, Japan



Auxiliary Control Switchboard by General Electric Co., U.S.A.

by this plant far surpassing any previously experienced in Japan. The economy of this station compares very favorably with that of the large super-power stations which have recently been erected in the vicinity of New York, Boston, and Philadelphia.

The design of the station was wholly carried out by the engineers of the Toho Company. Particular care was taken in insuring that suitable foundations were laid down to carry the extra heavy equipment both in the turbine room and in the boiler room. As is noted in the foregoing summary, the largest boilers in Japan, as well as the largest condenser, are installed in this plant. Every effort was made to insure against interruptions of service and the plant has been operating since November 15 without any trouble whatsoever.



Main Control Switchboard, Benchboard Type, by General Electric Co., U.S.A.

At the time of the opening of the plant Mr. K. Adachi, Minister of Communications, spoke of electricity as it affects the industrial enterprises of the nation. He said :

" Japan must stand on an industrial development which largely depends upon electricity. It is, therefore, necessary for the country to supply power at the lowest possible rate. Hydro-electricity must be augmented with the assistance of steam electricity.

" With this object in view, the Toho Electric Power Company has erected one of the two turbo-generators in the country and this undertaking is praiseworthy. High steam pressure and large capacity as well as efficiency and output feature the Toho Steam Electric Plant in Nagoya. The arrangement of equipment is on superior design and it can be justly called the most modern and powerful station in Japan. It is no exaggeration to say that this steam electric plant has marked an epoch in the electric industry of Japan.

" The untiring efforts of officials and experts toward the erection of the station deserve admiration and the completion of this plant will go a long way toward the development of electric industry of Japan."

The officers of the Toho Power Company responsible for the success of this plant are,

President, Mr. Yataro Itami
Vice President, and General Manager, Y. Matsumaga.
Chief Engineer of Toho Electric Power Co., M. Fukada.
Mechanical engineers in charge of construction, S. Yamada and N. Sakurai.
Electrical engineer and operating engineer, S. Tsujino.

The Nottingham Works of Messrs. Cammell, Laird & Co., Ltd., have secured the contract for the construction of 220 broad gauge steel coaches for the Indian State Railways, and 110 for the North Western Railway.

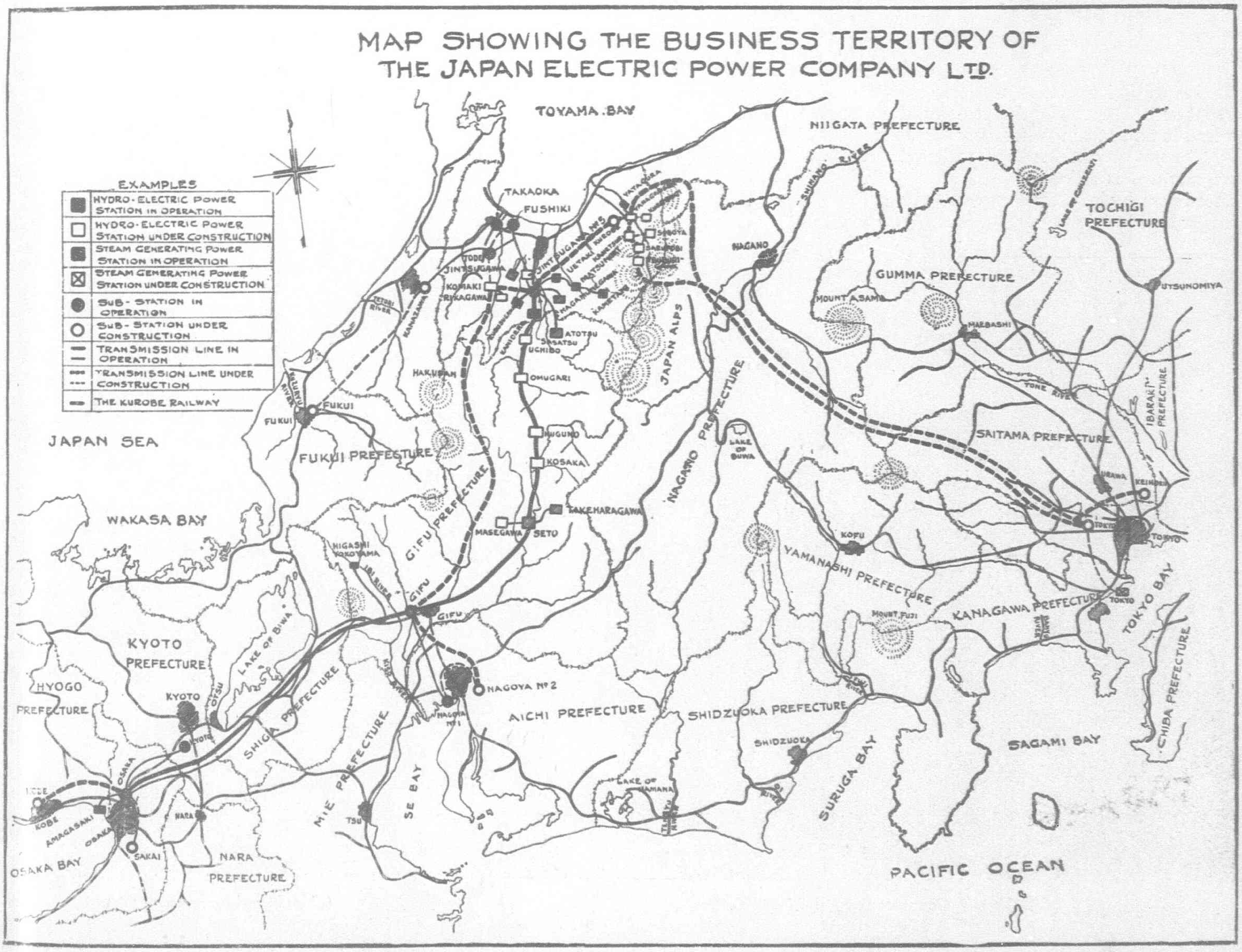
Structural steelwork in connection with the electrification of the Bombay, Baroda and Central Indian Railway is to be supplied by W. Bain & Company, Ltd., of Coatbridge, Scotland.

Sheffield manufacturing circles have been very interested in the announcement from Tokyo to the effect that the Japanese railway authorities have decided to replace the American type of rails by British. The two chief firms concerned are the United Steel Companies and Messrs. Cammell, Laird & Co., Ltd., who have furnaces at Sheffield and Penistone. Other firms in the city do not specialize in ordinary carbon steel rails so much as in the manufacture of points and crossings of manganese and other special steels.

The Story of the Japan Electric Power Company, Ltd.

MORE than ten years ago, the Ujikawa Electric Company drew up a scheme for the utilization of rich water power in central part of Japan in order to supply power to Osaka. In 1911, under the name of promoters of Kansai Electric Power Company, Ltd., they applied to the authorities for the utilization of water power delivery output, of which is about 50,000 kilowatt obtainable at Seto and several other points in the course of the Hida river. This scheme led to the formation of Japan Electric Power Company, Ltd., which has developed an extensive system of long-distance power transmission. In those days, power could not be transmitted beyond about 150 miles, owing to technical difficulties. From that time on, however, remarkable progress has been made in its technique and moreover, industrial activities created an increasing demand for power. The company then decided to utilize the power obtainable from Gifu Prefecture and also from Toyama Prefecture in order to supply the Kansai district. In these extensions of the original plans, was

Kanidera Power Station



originated the Japan Electric Power Company, Ltd., in December 1919, with a capital of Yen 50,000,000.

The company aims at generating 268,300 kilowatt from hydraulic sources and 100,000 kilowatt from steam generating plants. Adding 120,000 kilowatts for which this company is now filing an application, it will reach over 488,000 kilowatts. Besides this company has already concluded a contract for the purchase of power to the extent of 80,000 kilowatt. The object of this company is gradually to develop its generating power and to supply power to the vast field of Osaka and its adjoining districts. The equipment of power transmission for the scheme will be altered according to the extension of power stations as well as the increase of demand for power. The main transmission line between Osaka and Sasatsu Work, completed at the end of last year, is the largest in its scope in Japan.

The following are the names of hydro-electric power stations for which the company has been granted permission from the authorities :—

Name of Station	Delivery Output *Kilo*	Name of River	Volume of Water	Effective Head *Shaku**	Length of Power Canal *Ken**
Seto	27,000	Hida	1,150	338	6,573
Kosaka	14,100	do.	600	372	4,798
Kuguno	6,500	do.	270	379	7,051
Masegawa	9,600	do.	300	496	7,817
Takeharagawa ...	1,000	do.	90	210	1,877
Kanidera	50,000	Jiutsu	1,600	444	6,308
Omugari	5,200	do.	700	120	2,356
Uchibo	26,100	do.	1,300	300	6,150
Jintsugawa No. 5 ...	22,000	do.	2,000	162	4,223
Yanagawara ...	43,500	Kurobegawa	1,375	413	4,210
Kanetsuri	45,200	do.	1,100	676	3,365
Kuronagi	10,000	do.	280	536	1,400
Soboya	8,100	do.	130	930	1,100

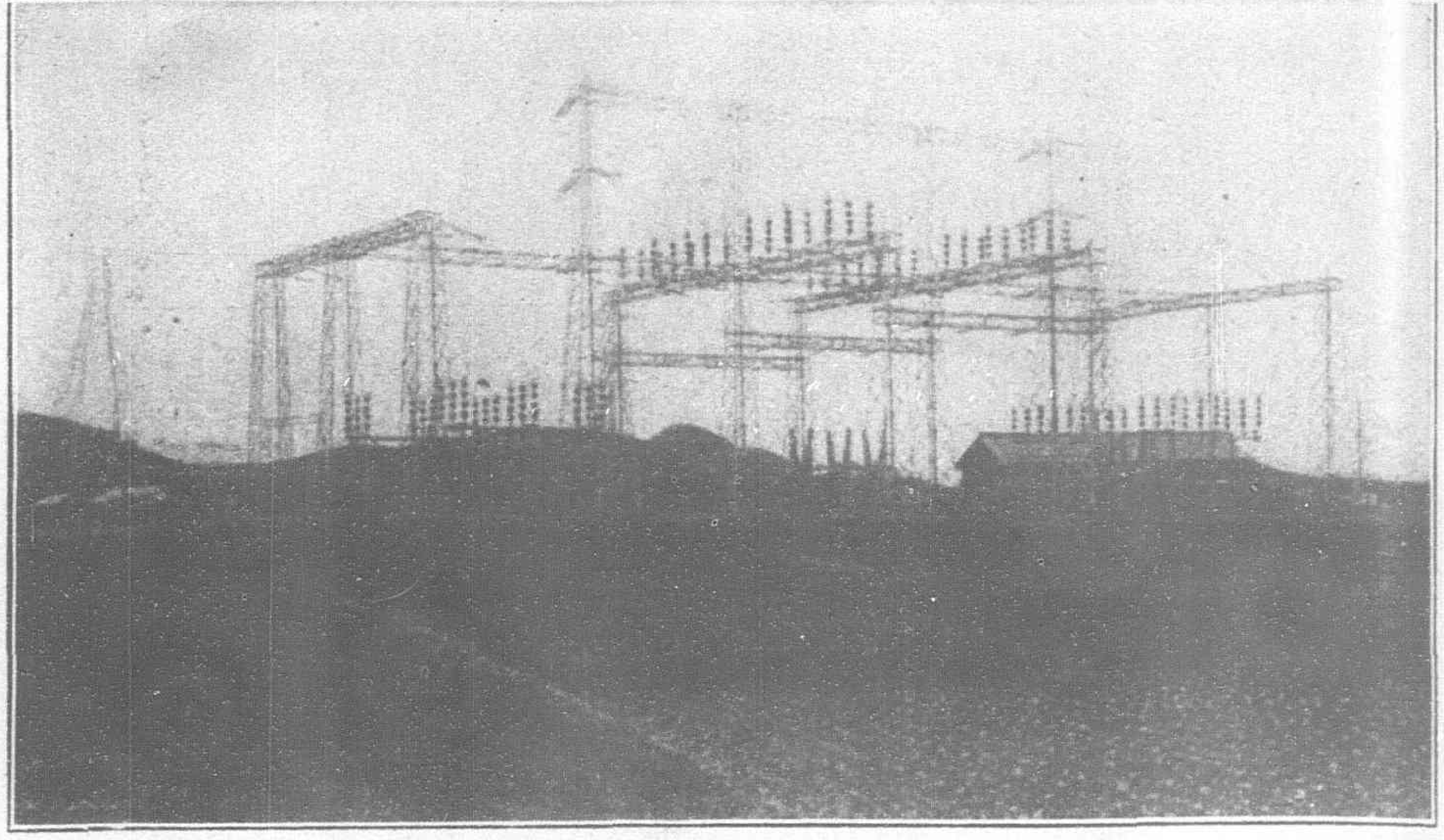
* One shaku equals to 0.99-ft. and one ken equals to about one feet.

Amagasaki steam generating power station has the delivery output of 100,000. So, the gross total of delivery output both from hydraulic and steam generating plants reaches 368,300 kilowatt.

The power stations both hydraulic and steam operated by this company are as follows :

Takegawara hydro-electric power station 1,000 kilowatt.

Seto hydro-electric power station 27,000 kilowatt.



Seki Switching Station (There are three Switching Stations along the line).

Amagasaki steam generating power plant :

100,000 kilowatt of which 50,000 kilowatt has been completed in October, 1924, while the equipment for the remaining kilowatt was brought to a completion in October, 1925.

Kanidera hydro-electric power station 50,000 kilowatt (completed in June, 1925).

Yanagawara hydro-electric power station 43,500 kilowatt. (will be completed in June, 1926).

Main Transmission Line (secondary circuit iron tower).

The length covers 154 miles from the section between Osaka and Sasatsu.

The voltage is 154,000 volt.

The volume of power transmittable is 125,000 kilowatt.

Nagoya Transmission Line (secondary circuit iron tower).

(this was completed in July, 1924). The length covers 23 miles from the section between Gifu and Nagoya. The voltage is 77,000 volt. The volume of power transmitted is 50,000 kilowatt.

Transmission Line between Osaka and Ogaki (Ibikawa Line).

The length covers 86.5 miles

The voltage is 77,000 volt.

The volume of power transmittable is 10,000 kilowatt.

The Business Territory.

Hyogo Prefecture : City of Kobe, City of Amagasaki, Muko Gun and Kawabe Gun.

Osaka Prefecture : City of Osaka, City of Sakai, Higashi-Nari-Gun,

Nishi-Nari Gun, Mishima Gun, Toyono Gun.

Kyoto Prefecture : City of Kyoto, Katsuno Gun, Kii Gun, Kuze Gun.

Shiga Prefecture : Inukami Gun. Gifu Prefecture : City of Gifu, City of Ogaki, Inaba Gun, Abachi Gun.

Aichi Prefecture : City of Nagoya, Aichi Gun, Nishi-Kasugai Gun.

Toyama Prefecture : City of Toyama, City of Takaoka, Kamishinkawa Gun, Fmoi Gun, Imidzu Gun.

In addition to these, the Company has applied to the authorities for sanction further 10 cities and 31 guns as its business territory.

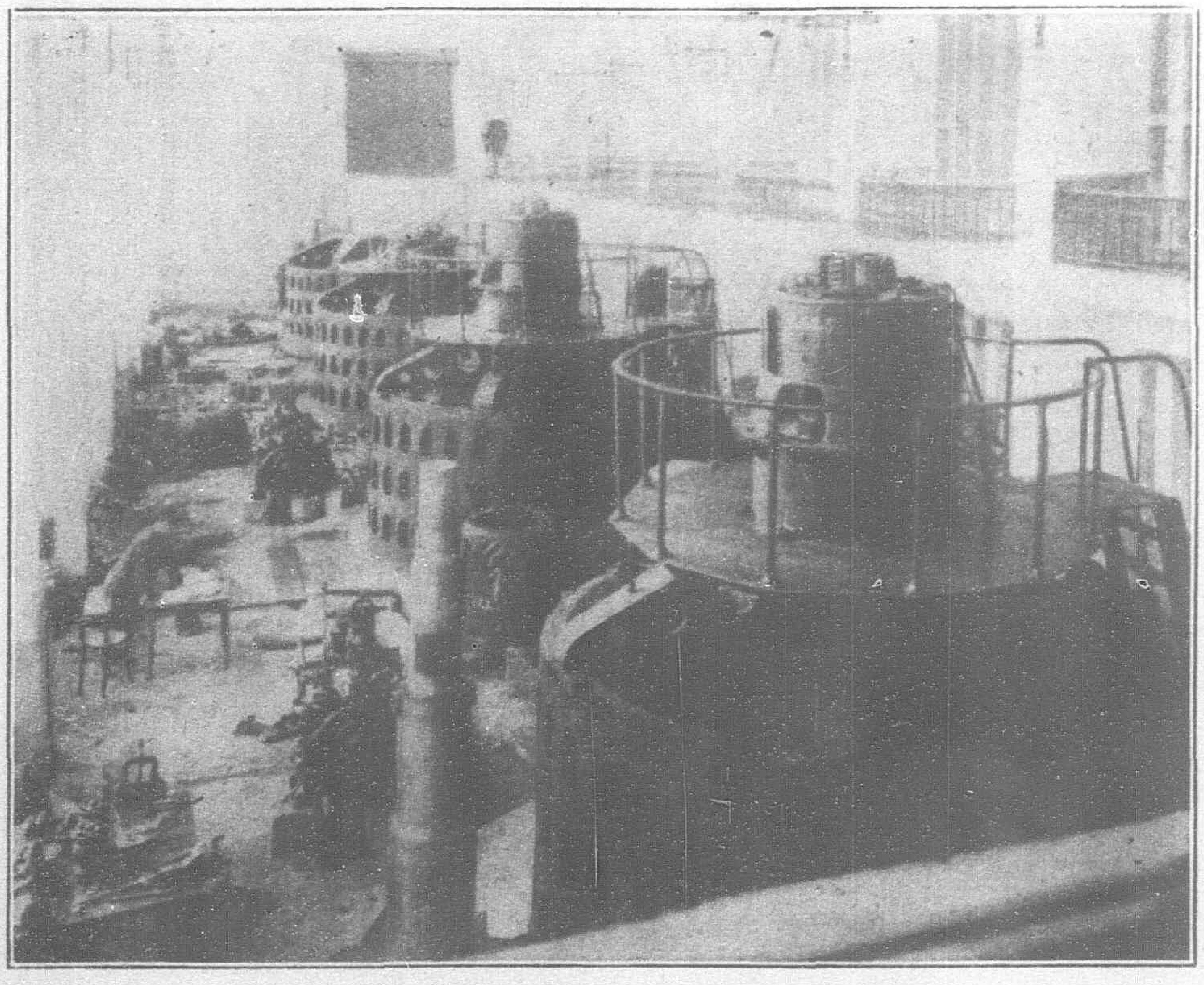
In March, 1924, this company commenced operations and is now supplying the power by means of the following lines :

By Main Transmission Line :

Seto	.. 27,000 kilowatt
Etchu Electric Power Co.	.. 10,000 ,,
Jintsugawa Electric Co.	4,000 ,,
Toyamaken Hydro-electric Co. ..	10,000 ,,
Total	.. 51,000 ,,

By Ibigawa Line :

Ibigawa Electric Co. ..	.. 10,000 ,,



4 Sets of Generators each 7,5000 K. V. A.

(*Continued on page 132.*)

The Shanghai Tram Systems

SHANGHAI has what is said to be for the car miles run one of the busiest services in the world. This is the system owned by the Shanghai Electric Construction Co., Ltd., which holds a franchise for operating in the International Settlement. There are two other systems in the city, one operated in the French Concession by the Compagnie Francaise de Tramways et d'Eclairage Electriques de Changhai and the other in Chinese territory by a Chinese-owned company, the Chinese Electric Power Co., Ltd.

The line in the International Settlement has a track length of 25.91 miles. During 1924 it carried 127,113,793 passengers, 10,592,816 a month on the average, or about 348,257 a day . The busiest periods of the day are from 7.30 to 9.30 a.m., at noon, and from 4.30 to 6.30 p.m.

The line in the International Settlement in 1924 received 1.87 cents, silver, per passenger per mile travelled. This does not take into account persons using season tickets. The number of passengers per car mile was 20.83 in the International Settlement, and 13.51 in the Chinese city. During the first three months of 1925 the line in the International Settlement carried 31,366,953 passengers and its cars ran 1,529,647 miles. This company's income during 1924 was $4,509,229.

Fares are collected in coppers and the hypothesis that subsidiary coins are decimal fractions of the dollar is maintained. A ten-cent piece is considered by the tram company as equal to 10 coppers and a 20-cent coin as equal to 20 coppers. The depreciation of more than 50 per cent in copper coins in the past few years has caused a considerable book loss to the company, but the huge turnover made it possible to pay a dividend of 20 per cent in 1924. The minimum first class fare charged by the International line is 4 coppers and the maximum 15 coppers. Third class fares range between 2 and 8 coppers. Cars of all three systems in Shanghai have first and third class compartments. Because of the continued depreciation of coppers, they have increased fares in the past few months as estimated in coppers. The Chinese line now charges from 5 to 15 coppers for first class and from 3 to 10 for third. Fares on the French line range between 6 and 24 coppers for first class and from 3 to 18 for third.

Besides the regular tickets, season tickets are issued, renewable monthly. The Chinese line does not issue these. The charge for an adult's first class ticket good on both the International and French lines is $10 a month. For one line only the charge is $6 a month for first class. Third class season tickets are sold to cover three months and cost $9. Children under 15 are charged half rates. There are no half rates for ordinary paid fares.

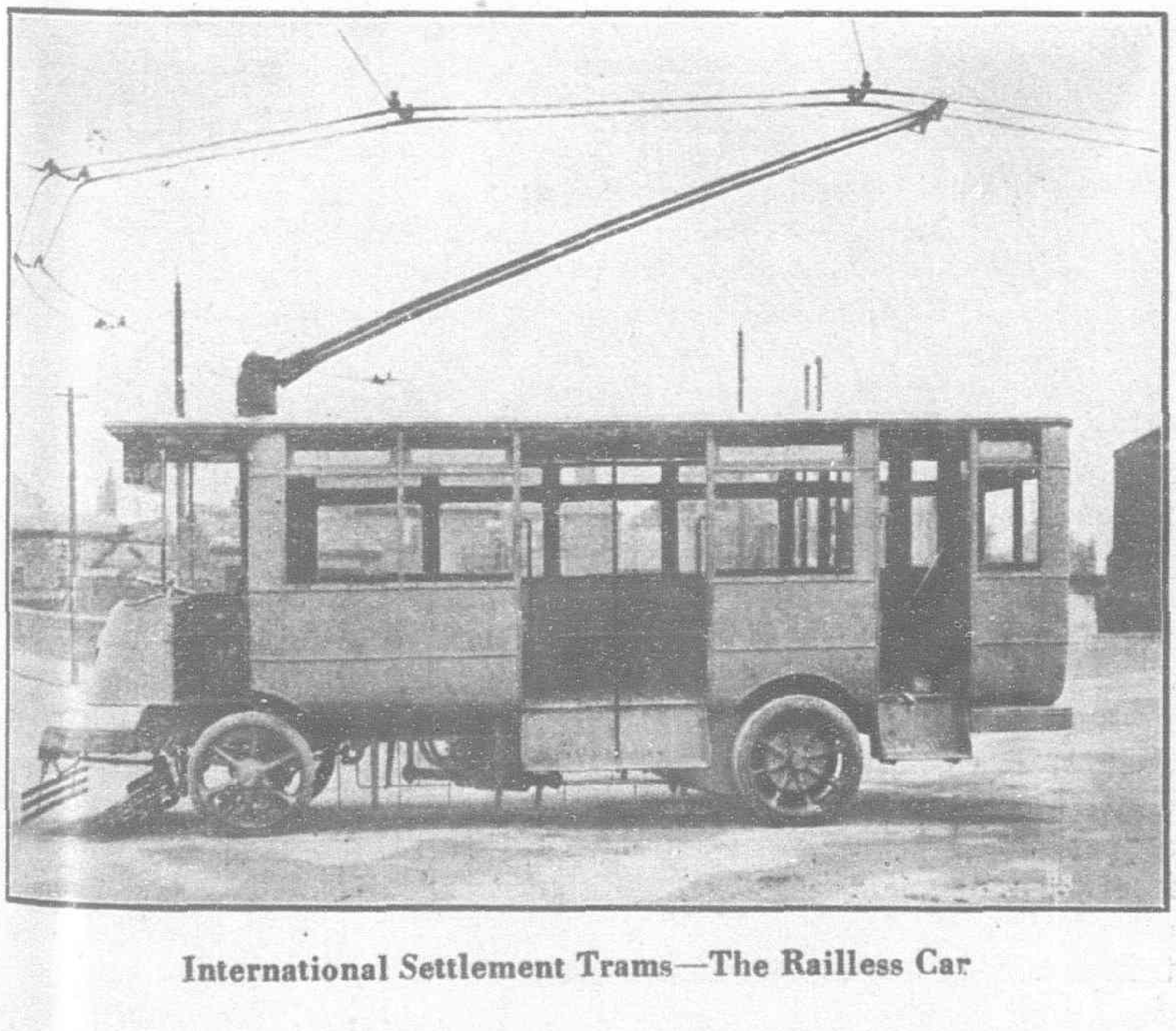
The first tram cars in Shanghai were those of the Shanghai Electric Construction Co. These went into sevice in May, 1908. The company was promoted in 1905, having been registered in London on December 9 of that year. Under a clause of the franchise granted by the Shanghai Municipal Council the company pays 5 per cent of its gross receipts to the Council and agrees to purchase all its electric current from the Municipal Electricity Department. The company's capital originally was £320,000. This was subsequently increased to the present figure of £500,000. By the terms of the charter the Council may purchase the company as a going concern at the end of 35 years after the date of the franchise, or at the end of any subsequent period of seven years. One of the other terms was that the company should maintain the road surface inside and 18 inches outside the rails.

From a small beginning the company has extended its line until it now has in service a total of 25.91 miles of track and 2.05 miles of railless trolley routes. The total owned by all three companies is 55.70 miles, including the railless routes. The company in the International Settlement three years ago began what was then an experiment with railless trolley buses. It is claimed that they are very satisfactory and extensions are talked of.

The second company to begin a tram service in the city was the French company. This was incorporated in Paris in 1906. The head office is in Paris and the administrative office at 227, Avenue Dubail, Shanghai. Its capital is 12,000,000 francs, made up of 48,000 shares of 250 francs each, tax free. This company now has 15.26 miles of line. It has 43 cars and 17 trailers. Its current is supplied by its own power plant, which is the same as that supplying all domestic and industrial users in the French Concession.

The Chinese system was constructed by a concern organised in 1917, at which time it was known as the Shanghai Chinese Merchants Electric Supply Co., Ltd. The name has since been changed to the Chinese Electric Power Company, Ltd. The company was registered with the Chinese government in 1919. Its capital is $2,000,000. It has 12.48 miles of track and 31 cars and 8 trailers. In 1924 the Chinese company received 87,081,055 coppers.

The three systems cover the main business and residential sections of the city under foreign and Chinese administration, except the Chinese district of Chapei. Some months ago the Shanghai-Paoshan Tramway Company, Ltd., was organised by a number of Chinese to start a line in Chapei, which is a fairly densely populated Chinese business and residentials section. There are at present a number of bus lines serving this district but these are considered inadequate. The longest line in the French Concession is from



International Settlement Trams—The Railless Car

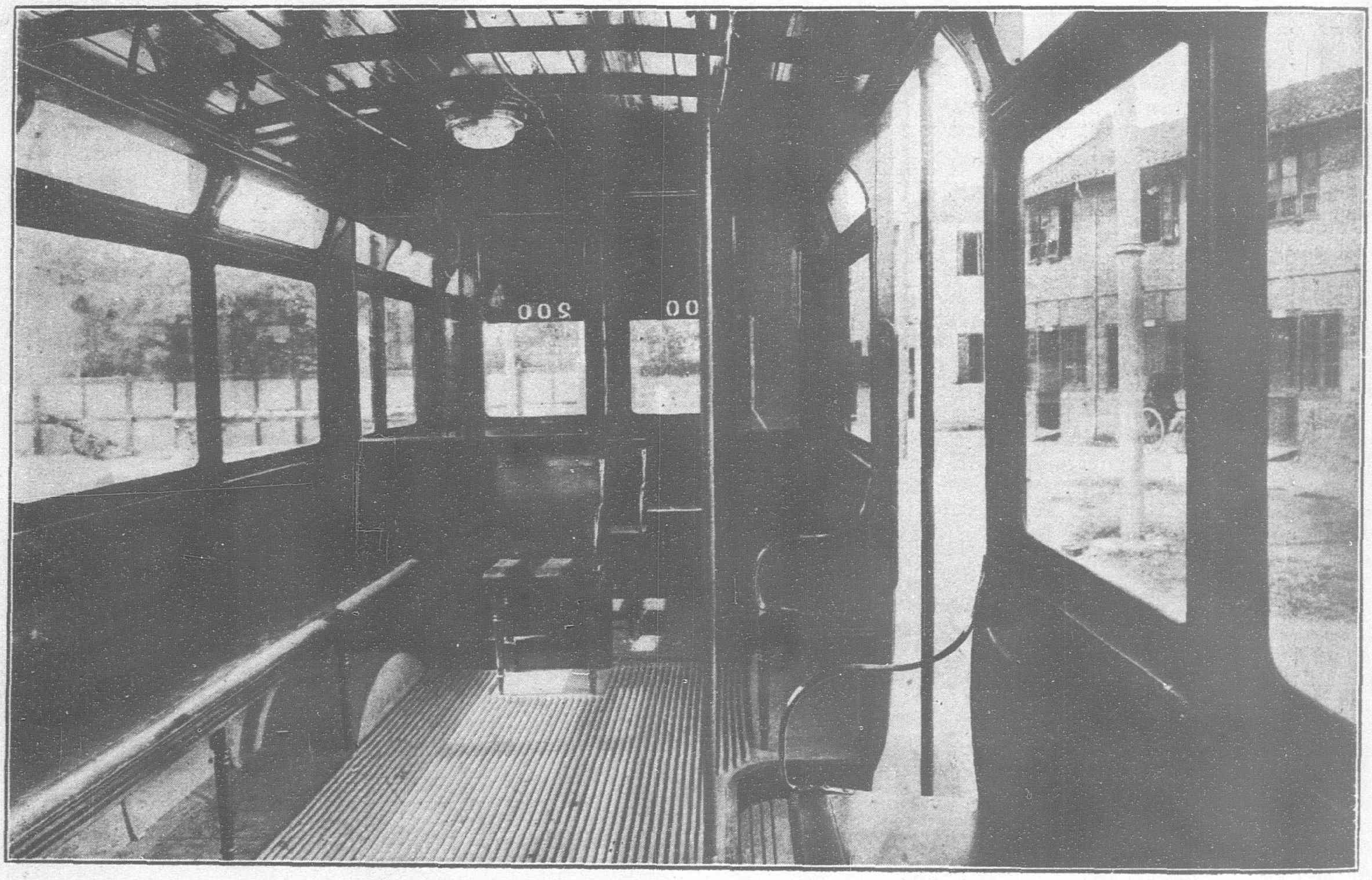
Inside Training of Motormen

the Marche de l'Est to Siccawei. The shortest is probably the railless line running from North Honan Bridge to the south end of Fokien Road.

In the International Settlement there are lines running to Bubbling Well (extreme west end), to Yangtszepoo (extreme east end), to Marche de l'Est (extreme south end) and to North Szechwan Road (extreme north end). In the French Concession there are lines running from Siccawei in the west to Marche de l'Est in the east, to Pont St. Catherine in the extreme south and to the Shanghai-Nanking Railway Station in the extreme north by the inter-Settlement service. In Chinese territory there are lines around the former city walls, lines to the Kiangnan Arsenal and to Marche de l'Est. All of the lines in Shanghai are of one meter gauge. The French company has a reciprocal agreement with the company in the International Settlement for an inter-Settlement service on two lines. However, when the car of one company goes outside its limit, tickets of the other company must be purchased. A similar arrangement is maintained by the French and Chinese companies for a line running along the Boulevard des Deux Republiques, so that passengers passing from one district to another need not change cars.

Each of the companies has followed the practice of purchasing its car frame, work, motors rails and machinery abroad and constructing the bodies in Shanghai. The Chinese system has purchased nearly all of its track from the Union Electric Car Company, Ltd., of Preston, England. The coachwork was built by the Yur Sing Company in Shanghai. Its motors, controllers and most of the other electrical equipment have been bought chiefly from the Gutehoffnungshutte, a German company. The rails were brought to China already prepared for laying down.

The French company secured its motor and mechanical equipment chiefly in France and Belgium. The Shanghai Electric Construction Company purchased its equipment largely in England and Scotland. This company has a coach factory, coil winding and repairing shops, an armature department, a foundry and welding department, and a printing department which turns out 180,000,000 tickets a year.



The Interior of a Railless Tram

The Story of the Japan Electric Power Company, Ltd.

(Continued from page 130).

This company, in May, 1924, concluded contracts with Ujikawa Electric Company, Toho Electric Power Company and several other companies for the supply of power aggregating 185,000 kilowatt.

As a pioneer of the hydro-electric enterprises this company is in a position to secure ideal places for the power plant at the lowest cost. In addition, as they were able to purchase the necessary machinery and materials at the most moderate prices, the construction expenses naturally decreased in their amount against the original estimate.

The sources of power of this company are scattered in the basins of the rivers Hida, Jiutsu and Kurobe all in the mountain range of the Japan Alps. These districts are the zone of dense forest in Japan, with maximum rainfall throughout the year. These rivers have their peculiar features respectively, some flowing into the Japan Sea, while the other emptying into the Pacific Ocean. Under the condition, even in the time of draught or innudation, they would adjust the volume of water themselves. Thus, they are always free from all such happenings in producing electric power. The completion of Amagasaki Steam generating power plant makes things doubly sure.

Petroleum and Residual Bitumens in the Philippines*

By Leopoldo A. Faustino

INTEREST in the petroleum resources of the Philippines has continued unabated. With the passage of the Petroleum Leasing Act and the publication of the regulations of the Department of Agriculture and Natural Resources providing ways and means for acquiring tracts of land for prospecting and development, numerous companies and individuals have begun earnest search for favorable structures. All the localities known or reported to contain oil have received attention and one district at least has been prospected by drilling. Contrary to impressions which have gained considerable credence abroad, the Government of the Philippine Islands is trying its best to help promote the development of the petroleum industry. The petroleum laws enacted and the regulations promulgated have been made as liberal as is consistent with good sound policies. Apparently, the point of greatest objection is the short period of five years for which a lease may be had. It is desired to call attention to the provisions of law regarding this point, wherein it is specifically stated that renewals may be had until the maximum of fifty years is reached. The lease period of five years has been decided upon to meet local conditions and to save valuable oil land from falling into the hands of speculators. Companies and individuals who have acquired leases under the present laws will only need to show sufficient evidence that they have complied with the regulations, and that they want to hold the land for development and not for speculative purposes, in order to secure renewals of their leases. At the present writing petroleum in commercial quantities has not been found in any of the known Philippine localities, but it is hoped that, though gushers are not to be expected, small wells may be a reality in the not distant future. The following is a brief account of the petroleum development in the Philippine Islands during the last three years.

Oil Field Development During 1921, 1922 and 1923

Among the localities known or reported to contain oil, the following have been the subject of prospecting and development under the terms of the geological exploration leases:

South end of Bondoc Peninsula, Tayabas Province, south-eastern Luzon.
North-western part of Leyte Island.
South-eastern part of Mindoro.
Pidatan district in central Mindanao.
Toledo, Cebu.
Rizal Province, in the vicinity of the town of Antipolo.

Bondoc Peninsula, Tayabas Province.—This district has been the scene of the most active prospecting and development. In a recent report† by Jorge B. Vargas, Director of Lands, the total area of petroleum leaseholds in the district on March 31, 1923, was placed at about 41,000 hectares. Several companies and individuals had geological exploration and drilling leases covering the more promising areas, but only two actually sank drill holes to prove their holdings. The other companies maintained a more or less "watchful-waiting" attitude, and gave up their leases one by one when the results of the drilling operations became generally known.

E. A. Heise and the Union Oil Company had several leases, but little or no development work was done by either. The Banisilan Oil Company field application for the areas which were surrendered by the Union Oil Company, but terminated its lease on December 31, 1923, without attempting to drill. E. W. McDaniel operated in the Maglihi area. Several shallow wells have been drilled in this section, three of which have produced petroleum in small quantities by pumping. These wells have never been pumped for any length of time, partly on account of lack of storage facilities, and it is not known how much petroleum can be obtained by continuous pumping, or whether enough petroleum is accumulating at the bottom of the wells to keep the pumps busy. It is claimed, however, that Banco wells No. 3, No. 4, and No. 5, which were drilled in 1918 and 1919, would probably average about one barrel a day. The first well drilled in Bondoc Peninsula was Bahay well No. 1, in 1906. Drilling was done entirely by hand power and reached a depth of 127 feet, and a small quantity of gas and oil was obtained.

The Richmond Petroleum Company,‡ a subsidiary of the Standard Oil Company of California, started drilling operations in this district in the early part of 1921. Several test wells were sunk, the greatest depth having been reached in Piña Well No. 1, which was drilled to a depth of 5,117 feet. Other wells are Amuguis No. 1, drilled to a depth of 1,323 feet; Sapa No. 1, 3,757 feet; and Yebaan No. 1, 617 feet. According to reports on these wells the Richmond Petroleum Company has drilled at Bondoc Peninsula a total footage of 10,814. Slight indications of petroleum and natural gas have been encountered, but of oil nothing that even nearly approached commercial quantities was found under the structures tested. C. T. Newcomb, superintendent, Philippine district, Richmond Petroleum Company, has kindly donated to the Bureau of Science a sample of oil recovered from Piña Well No. 1 at between 101 and 1,019 feet; this sample can be seen in the exhibit room of the Division of Geology and Mines. Other companies that applied for drilling leases in this district are the Lucena Oil Company, the Philippine Oil Company, the Columbia Oil Company, the Paco Oil Company, the Manila Oil and Pipe Association, and the American Oil Company. None of these commenced actual drilling and all surrendered their leases in 1923.

Another locality to receive attention from the Richmond Petroleum Company is northwest Leyte, where this company had leases in the municipalities of San Isidro, Calubian, and Villaba. Though considerable geologic work was done here by the company, prospecting by drilling was not resorted to and the leases were terminated. William Anderson leased certain tracts of land in the municipalities of Villaba and San Isidro, and also certain areas in the municipalities of Leyte, Palompon, and Ormoc, but little or no development work was done on the properties. The Banisilan Oil Company had leases on the area adjoining the areas leased to Mr. Anderson. Mr. Elicaño, chief of the Division of Geology and Mines, undertook the geologic exploration for the company under the terms of a Bureau of Science industrial fellowship. Favorable structures were located which would warrant exploratory work by drilling, but nothing has as yet developed. Mr. Elicaño likewise did geologic exploration work in the vicinity of Calubian in the areas covered by the leases of the Union Oil Company, under the terms of an industrial fellowship. Geologic structures were found, but no drilling was done, and the leases were afterward submitted for cancellation.

Geologic exploration work was also undertaken in south-eastern Mindoro, in the municipality of San Jose, by Daywalt and Company. Under the terms of an industrial fellowship Antonio D. Alvir, geologist of the Division of Geology and Mines, was sent to do the geologic work. He has submitted a report to Daywalt and Company, but as yet nothing further has been done. Mr. Elicaño had previously visited the area.

In Toledo, Cebu, the Visayan Petroleum Company was granted a lease during the latter part of 1921, but at this writing nothing has been done. It will be remembered that two wells had been

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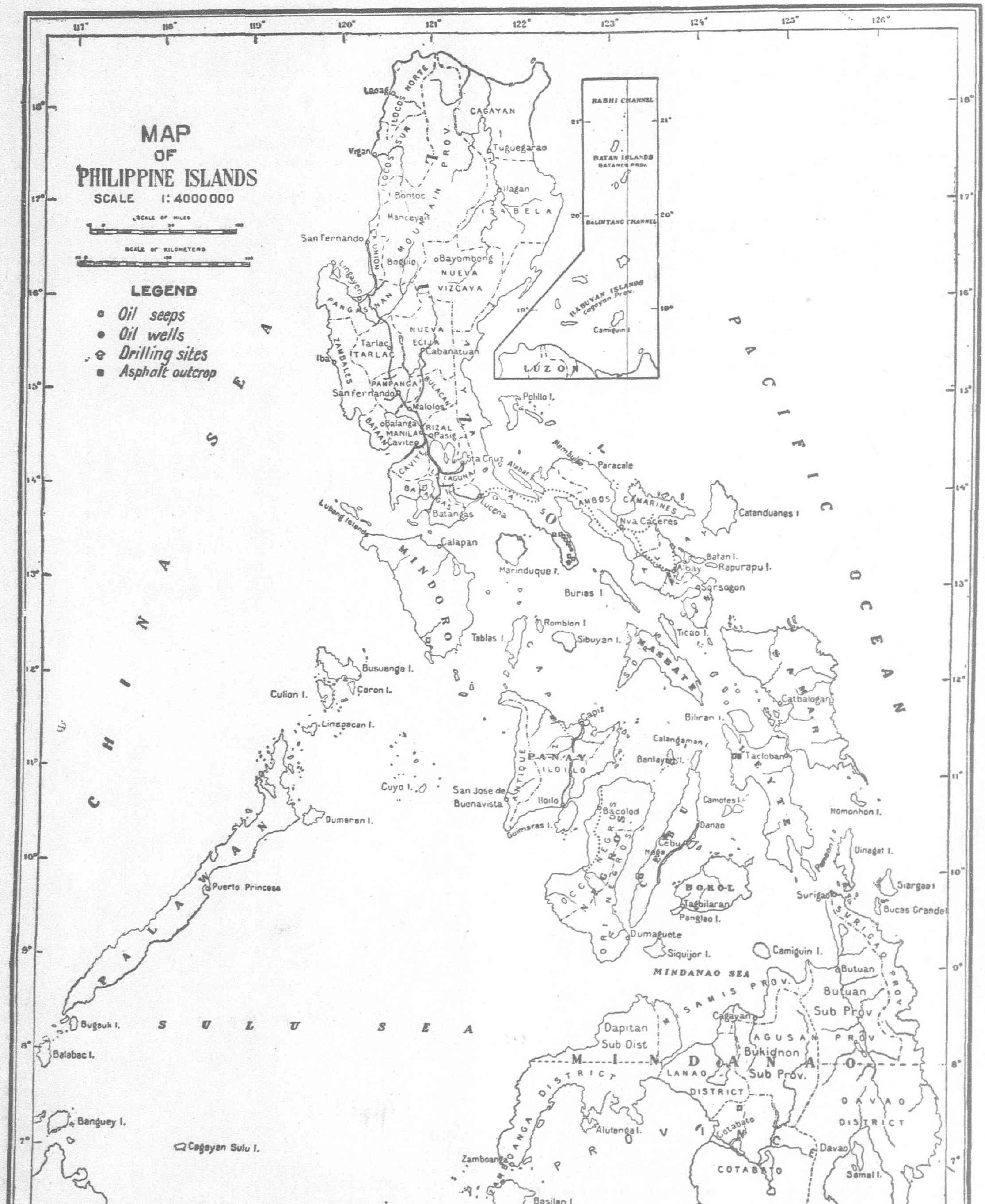
* Prepared by Division of Geology and Mines, Bureau of Science, Manila P.I.

† Not published.

‡ This company discontinued drilling activities in July, 1924, and has stored all its field equipment at Manila pending the finding of other favorable geological structures in other parts of the Archipelago. It has also surrendered all its leases.



Compiled by the Division of Mines, Bureau of Science, Manila, P.I., March, 1921. Under general supervision of W. D. Smith drilled in this area in 1896 which reached 244 and 344 meters in depth, respectively. Petroleum was encountered and a small amount was produced.

In the Pidatan oil district the Mindanao Petroleum Company was granted leases in March, 1921. No development work was done, however, and the leases were afterward submitted for cancellation. The Round Mountain Petroleum Company and the Barclay Petroleum Company had drilling leases in the area, but nothing was done and their leases were cancelled in 1923. The writer accompanied a geologic survey party to this district in 1920. Several months were spent in the field, and after completion of the systematic work on the fossils collected the chief geologist of the party will present for publication the scientific results of the expedition.

Persistent rumors regarding discovery of petroleum seepage in the vicinity of Antipolo, Rizal Province, led the Richmond Petroleum Company to apply for leases covering certain areas. When it became known that the Richmond Petroleum Company had made application for leases, an association of persons also applied for leases for contiguous areas. Doctor Dickerson of the Richmond Petroleum Company and Mr. Elicaño, working under the terms of a Bureau of Science industrial fellowship, made some preliminary investigations of the seepage. It was found that the district was not worthy of further exploratory work and the leases of the Richmond Petroleum Company were submitted for cancellation.

Residual Bitumens

According to Smith* the bitumen that impregnates the Malumbang limestone series in north-western Leyte, known commercially as rock asphalt, is to a large extent a paraffin residuum corresponding most nearly to the variety ozocerite. This is the material that has been developed by the Leyte Asphalt and Mineral Oil Company, and it has been successfully used as road material in Cebu and in other parts of the Philippine Islands. The greater part of the production has been shipped to Manila and Cebu. A small amount was sent to Japan for trial. The production in 1921 was only 766 metric tons, valued at 11,290 pesos. This was a marked decline from the production of 1920 which was approximately 2,000 tons and was valued at about 30,000 pesos. There has been no report of production for 1922 and 1923. The controlling interest in this company has changed hands and, according to reliable information, Japanese capital will undertake the development of the properties.

Importation of "Mineral Crude Oil" and Asphalt

The importation of " mineral crude oil " shows very marked increases during the last three years. The year 1922 represents the banner year, when 1,894,308 barrels were imported, valued at 5,337,775 pesos. In 1923 there was a slight decrease, the number of barrels totaling only 1,377,559, valued at 3,369,189 pesos. From the marketing viewpoint the most important event was the entry of the Associated Oil Company into the Philippines, which marked the beginning of a long price war. Table 1 shows the extent of importation of " mineral crude oil " from various countries during the last five years, taken from the annual reports of the Director of Customs. Table 2 gives the importation of asphalt for 1922 and 1923. Figures for 1921 are not available, as they were included under item " Residuum, including tar, and all others from which the light bodies have been distilled " in the Customs Report for 1921. The greater part of the imported asphalt is used in the construction, maintenance, and treatment of roads and pavements.

TABLE 1.—"MINERAL CRUDE OIL" IMPORTED INTO THE PHILIPPINE ISLANDS, 1919-1923, BY COUNTRIES, IN BARRELS OF 42 UNITED STATES GALLONS

Country.	1923		1922		1921		1920		1919	
	Quantity. *bbls.*	Value. *Pesos.*	Quantity. *bbls.*	Value. *Pesos.*	Quantity. *bbls.*	Value. *Pesos.*	Quantity. *bbls.*	Value. *Pesos.*	Quantity. *bbls.*	Value. *Pesos.*
United States	1,047,178	2,279,024	1,759,034	4,890,906	1,017	8,799	140,512	1,519,006	4,894	34,236
United Kingdom	—	—	—	—	2	54	278	992	—	—
Germany...	—	—	1	56	—	—	—	—	—	—
British East Indies	—	—	—	—	10,037	56,381	637	4,650	347	5,156
Dutch East Indies	330,381	1,090,165	135,251	446,261	174,598	889,229	114,868	485,576	63,371	313,047
Japan	—	—	22	552	—	—	—	—	—	—
Total	1,377,559	3,369,189	1,894,308	5,337,775	185,654	954,463	256,295	2,010,224	68,612	352,439

TABLE 2.—ASPHALT IMPORTED INTO THE PHILIPPINE ISLANDS IN 1922 AND 1923, BY COUNTRIES.

Source.	1923		1922	
	Quantity. *kg.*	Value. *Pseos.*	Quantity. *kg.*	Value. *Pesos.*
United States	1,865,634	79,019	1,224,055	60,280
United Kingdom :	—	—	2,550	133
Czechoslovakia	1,114	38	—	—
Germany...	16	3	125	10
Dutch East Indies	844	64	—	—
Australia...	—	—	170	200
Total	1,867,608	79,124	1,226,900	60,623

New Vessel for the Rajah of Sarawak

ON December 30, Messrs. James Pollock, Sons and Company, Ltd., ran trials on the River Thames of the M. Y. *Maimuna*, which they have built to their own designs at their shipyard at Faversham, Kent, to the order of His Highness the Rajah of Sarawak, who is now in the East. Included in the party on board were H. H. the Tuan Bunsu of Sarawak (Captain Harry Brooke), Mr. C. Willes Johnson, the Government agent and a number of guests.

The *Maimuna*, which is of steel, has a length of 140 feet a breadth of 25 feet and a draft of 6 feet 6 inches, the latter being necessary to enable the vessel to negotiate the bars at the mouth of most of the rivers in Sarawak, and the propelling machinery consists of a 350 B.H.P. four cylinder Bolinder direct reversible heavy oil marine engine. The vessel is fitted throughout with electric light and fans taking power from a 4 k.w. dynamo coupled to a 7 B.H.P. Bolinder engine. The deck equipment consists of a 10-cwt compressed air " Reavell " winch for which a 12 B.H.P. Bolinder engine is installed in the engine room together with the necessary " Reavell " compressor. The windlass has a messenger drive from the winch. Among the life saving equipment are two life boats, one of which is fitted with a 6-7 B.H.P. Bolinder " Beta " engine, driving a three-bladed propeller through reverse gear.

The accommodation includes nine two-berth cabins, six single berth cabins, and a dining saloon taking the full width of the vessel with a seating capacity for 28 people. The owner's cabin, which is on the promenade deck, is built of teak and fitted with cot beds, writing table, folding lavatory, dressing table, wardrobes, etc. Cargo space for about 50 tons deadweight is also provided.

There are two features worthy of special mention : a Star Contra propeller of the type " IB " (with two vertical and two horizontal blades) is fitted in the stern frame. Among other advantages this device enables the vessel either to increase her speed without an increase in horsepower, or to maintain her normal speed with a reduction in power and fuel consumption. In either direction it will effect considerable economy in the running of the vessel, and further, the side blades are of special service in heavy weather. The other feature is that the life boats are carried in " Sureal " sell-acting davits, which in brief are gravity davits enabling a life boat to be put out in a few seconds by one man. This is of special advantage in a ship of this description where a minimum crew can be carried if desired. The fuel tanks have a radius of 2,400 miles without rebunkering.

The trials proved most satisfactory, and the vessel, which will sail for the East early in 1926, is a fine type of its class and a credit to the builders. She should prove a valuable acquisition to the fleet of the Sarawak Government.

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* Mineral Resources of the Philippine Islands for 1919 and 1920 (1922) 59.

The N.D.L. Passenger Liner "Fulda."

Twin-screw Vessel for the Far East, or Alternatively the North Atlantic Trade

THE cargo and passenger liner *Fulda*, which was recently placed in the service of the Norddeutscher Lloyd, is a vessel with some unusual features, and is of special interest in that the hull construction is similar to six steamers, including the *Weser* and *Coblenz*, built in 1922 and 1923 for the same owners. The former is equipped with reciprocating steam machinery and the latter with general steam turbines, whilst the *Fulda* has twin-screw oil engines. All are engaged upon similar services.

The three vessels were constructed by the Weser Co. at Bremen, and shortly before proceeding on her maiden voyage we had the opportunity of inspecting the *Fulda* at the builders' yard. The following are the main details of the new ship :—

Length overall	460 ft.
Beam	57 ft. 6 ins.
Depth to upper deck	42 ft. 8 ins.
Draught	26 ft. 2 ins.
Deadweight capacity	9,000 tons
Gross register	9,540 tons
Net register	5,400 tons
Speed at above draught	13¼ knots
Total power	5,000 s.h.p.
Engine speed	83 r.p.m.

As is usual with this class of ship, arrangements are made for varying numbers of passengers, according to the trade which will be followed. When she is engaged in the Far Eastern service, the accommodation will be as follows :—

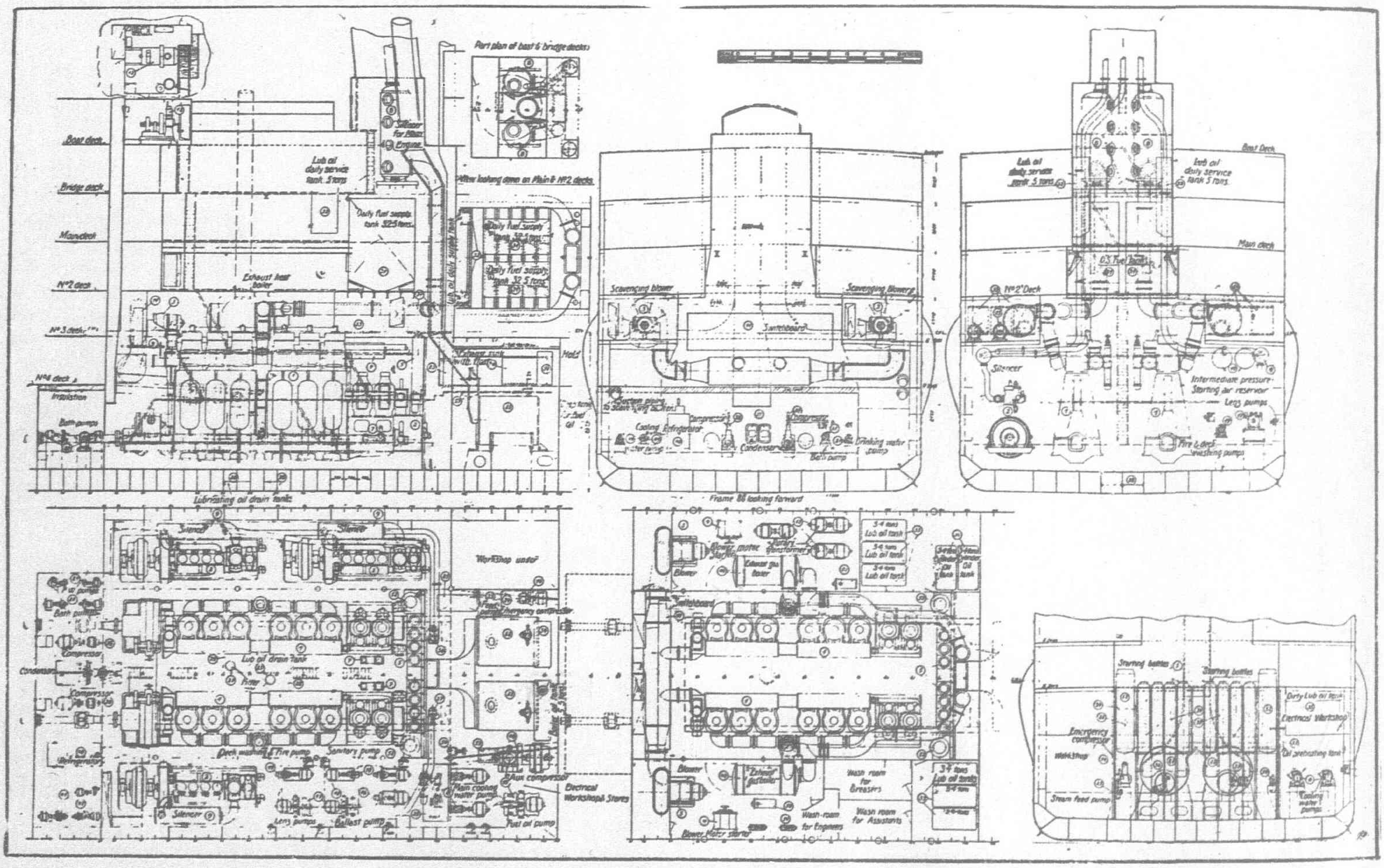
87 first-class passengers in 34 cabins.
165 second-class passengers in 58 cabins.

On the North American service, the accommodation will be as follows :—

104 first class passengers in 34 cabins.
53 second-class passengers in 22 cabins.
490 third-class passengers in 157 cabins.

The crew totals 166 men, and when it is desired to carry a larger number of passengers, the necessary partitions and cabin work can be erected in the course of a few hours. The vessel is provided with bulges, so that the necessity for water ballast can be dispensed with, or at least diminished, in spite of the high deck erections.

The two propelling engines are the largest of the Sulzer type that have yet been built in Germany. Each develops 2,500 b.h.p. at 83 r.p.m., and has six cylinders, 680 mm. bore with a piston stroke of 1,100 mm. On trials, a mean speed of 14 knots was maintained and the daily fuel consumption is stated to be 21 tons for all purposes. The length of the engine-room is about 60 ft.,



ENGINE-ROOM PLANS OF THE NORTH GENMAN LLOYD MOTOR CARGO AND PASSENGER SHIP "FULDA"

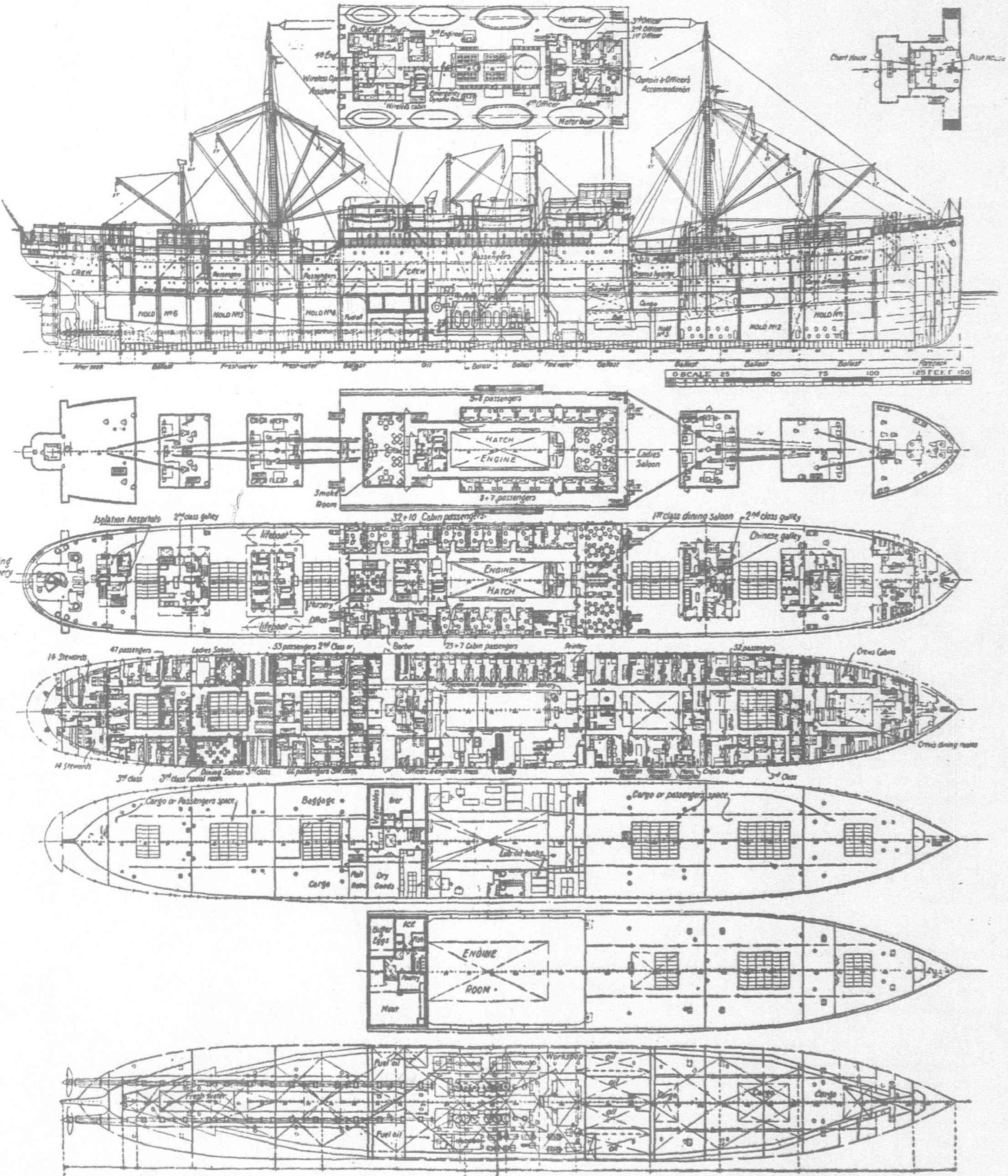
1.—Propelling engines. 2.—410 b.h.p. auxiliary engines. 3.—Scavenging-blowers. 4.—Scavenging-blower starters. 5.—Fight starting-air bottles, 800 litres, 75 atmospheres. 6.—Cooling-water pumps, 250 tons per hour. 7.—Reserve lubricating-oil pumps. 8 and 9.—Silencers. 10.—Internediate pressure starting-air reservoirs, 5,000 litres, 25 atmospheres. 11.—Switchboad. 12.—Emergency dynamo. 13.—Rotary converters. 14.—Emergency compressor. 15.—Fuel pump, 100 tons hour. 16.—Ballast pump, 150 tons per hour. 17.—Lenz pumps, 75 tons per hour. 18.—Sanitary pumps, 55 tons per hour. 19.—Fire pumps, 55 tons per hour. 20.—Bath pumps, 15 tons per hour. 21.—Fresh-water pumps, 9 tons per hour. 22.—Heating boilers, 4 atmospheres. 23 —Steam-feed pump. 27.—Lubricating-oil fiters. 28.—Lubricating-oil drain tanks. 30.—Boiler-oil day tank, 55 tons. 31.—Fuel-oil day tanks, 325 tons. 32.—Engine-oil tanks. 33.—Engine-oil tanks. 34.—Cylinder-oil tanks. 35.—Used lubricating-oil tank. 36.—Lubricating-oil separator. 37.—Fuel-oil pump, 5 tons per hour. 38.—Compressors. 39.—Condensers 40.—Refrigerator. 41.—Cooling-water pump. 42.—Brine pumps. 48.—Auxiliary compressor. 49.—Exhaust-heated boilers. 52.—Starting-air reservoirs, 2.500 litres, 75 atmospheres. 53.—Oil preheating tank for separator. 54.—Boiler-oil pump, 5 tons per hour.

but there are recesses at the forward end for the heating boilers and at the after-end for the auxiliary machinery.

The design of the engines follows the standard Sulzer practice, scavenging air being supplied from two electrically driven turbo blowers, which can draw the air to the blowers from the engine-room or, alternatively, from the deck. The control station for the two engines is at the top in the centre of the engines, and each drives two injection and starting-air compressors, one being sufficient for all the normal requirements of an engine.

Exhaust-heated Boilers

From each engine on the outboard side the exhaust gases are taken from the centre and led to a specially designed heat boiler in the wings of the engine-room before they are discharged to the silencers and thence to the funnel. These two boilers are heated solely by the exhaust gases and are in addition to the two oil-fired boilers which are located at the forward end of the engine-room in a recess. These are low-pressure boilers for heating, operating



THE NORTH GERMAN LLOYD CARGO AND PASSENGER SHIP "FULDA."

Length o.a.,	**460 ft.**	**Depth**	**42 ft. 8 ins.**	**Propeller speed**	**83 r.p.m.**
Beam	**57 ft. 6 ins.**	**Machinery**	**5,000 s.h.p.**	**Ship's speed**	**13½ knots.**

at about 58 lb. to 60 lb. per sq. in. and having a heating surface of 60 sq. metres.

The heating arrangements are unusual. There is a thermotank system, and in harbour the thermotanks are supplied with steam from the oil-fired boilers. At sea, the steam is derived from the exhaust-heated boilers, and during the trial trip special attention was paid to the operation of the plant to ascertain whether it had any effect on the power of the main engines.

The pressure of the exhaust gases was measured before and after the connection to the thermotanks was made. Before the experiment the pressure was somewhat irregular, but when the thermotanks were connected up the pressure became practically constant. There was an increase in the average exhaust pressure of only 8 ins. of water when the thermotanks were put into operation, and it is considered that this is too small to be of importance. The thermotanks, of course, heat the air supplied to the accommodation, this air being discharged through trunks throughout the ship.

It is unnecessary to describe the layout of the machinery in the engine-room in detail, as it is well shown on the engine-room arrangement plan. There are three auxiliary Diesel engines, each of 410 b.h.p., running at 200 r.p.m., and coupled to 275 kw. generators, the engines being of the Sulzer two-cycle type, driving their own scavenging pumps. The arrangement of compressed-air reservoirs may be noted. There are eight starting-air bottles, each of 800 litres capacity charged to 75 atmospheres pressure, in addition to two large reservoirs at the same pressure with a capacity of 2,500 litres. For actual starting, this pressure is reduced to 25 atmospheres, and there are two intermediate pressure reservoirs for starting purposes, each with a capacity of 5,000 litres.

The air compressors on the main engines (also the auxiliary air compressor if necessary) charge up the highpressure bottles at the full pressure, and thence the air is supplied through a reducing valve to the lower pressure at 25 atmospheres. The turbo-scavenging blowers are of the Brown-Boveri type and run at 2,000 r.p.m. to 2,500 r.p.m. They take approximately 600 amps. at 200 volts when operating at full speed, and, of course, one is sufficient for both engines.

The following details of the outputs of the various engine-room pumps may be of interest as representing a typical installation for main propelling machinery of 5,000 s.h.p. It may be added that the pistons and cylinders are cooled with sea-water and that one pump is utilized, having two stages, namely, discharg ing at 2 atmospheres and 3½ atmospheres respectively. The higher pressure is for the water supplied to the pistons. The pump outputs are as follow :—

1 Fuel pump, 100 tons per hour.
1 Ballast pump, 150 tons per hour.
2 Lenz pumps, 75 tons per hour.
2 Sanitary pumps, 55 tons per hour.
1 Deck-washing and fire pump, 55 tons per hour.
2 Bath pumps, 15 tons per hour
2 Drinking-water pumps, 9 tons per hour.
1 Daily service fuel transfer pump, 5 tons per hour.
2 Cooling-water pumps, 250 tons per hour.

In addition are the emergency compressor, emergency bilge pump, emergency dynamo installation, and a reserve lubricating-oil pump.

There are two daily-supply fuel tanks of 32½ tons each and one boiler-oil daily-service tank of 5½ tons. Two engine-oil tanks are fitted, each of 5 tons capacity, and six main tanks totalling 20.4 tons. The capacity of the two cylinder-oil service tanks is 6.8 tons, whilst the lubricating-oil drain tanks practically untouched. Running on the brake, this operation from astern to ahead was carried out in seven or eight seconds with the greatest ease.

A test of flexibility was made, and we timed the engine to run continuously at a speed of 22 r.p.m. on the brake. In order to effect this, the lift and timing of the fuel valves were altered by means of the reversing lever (A, Fig 2) as in the usual Sulzer system, so that the actual lift and the period of injection were probably reduced to about one-third of the normal. In addition, the blast injection-air pressure was reduced by means of the wheel (C) to 40 atmospheres, and it was demonstrated that all cylinders were firing satisfactorily at this low speed. A diagram taken from one cylinder with the indicator gear operating during 10 revolutions showed but a single line on the diagram. With the engine running at full power, not the silghtest sign of exhaust could be seen from the exhaust pipe.

An indication of the comparatively small amount of adjustment needed in a standard Diesel engine in these days is given by the fact that this set was started up on one day, and on the next, in the presence of the superintendent engineer of the Netherland Steamship Co., the full power of 4,000 s.h.p. was developed at the designed speed.

In the ship, the scavenging air will be supplied from an electrically driven Brown-Boveri turbo blower, which was in operation during the trials. The engine drives two injection-air compressores, each of which is of sufficent capacity to enable full power to be maintained, and these are operated from the end of the crankshaft. The governor gear (Fig. 3) is of standard Sulzer pattern, and is located at the after-end, whilst the turning motor is a duplicate of the air serve motor operating the manœuvring mechanism, and is driven by compressed air.

None of the auxiliary pumps is driven off the main engine apart from the compressors and a crosshead lubricating pump at the forward end, which, incidentally, is of the geared tpye, this being, we believe, a new construction. All the other pumps, including the piston and cylinder-cooling pumps, as well as the lubricating-oil pumps, are electrically operated by separate motors. The general details of construction of the engine are similar to previous Sulzer types. The new system of automatic valve scavenging is employed, by which disc valves within the scavenging trunk are automatically operated when the scavenging-air pressure within the trunk exceeds the exhaust-air pressure in the cylinder.

Test results showed the consumption to be 168 grammes per b.h.p.-hour, excluding the power required for the auxiliaries, or 185 grammes per b.h.p.-hour, including the auxiliary power. This is equivalent to about 0.407 lb. per b.h.p.-hour for all purposes—a normal consumption for this class of marine engine.

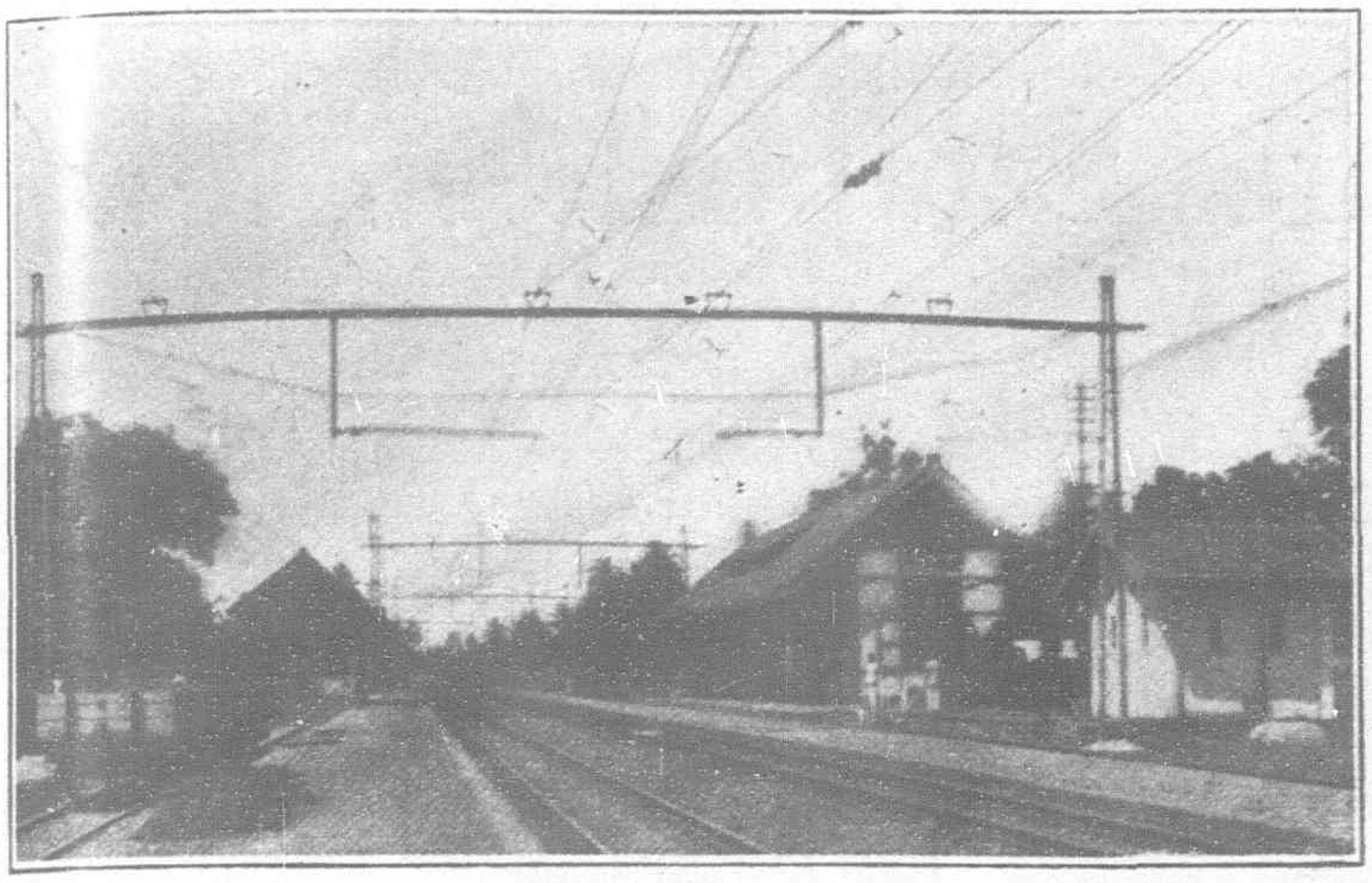
On the "P. C. Hooft," electric power is to be utilized for practically all purposes, and three Diesel-driven generators are to be installed. One of the engines employed for driving a dynamo was undergoing trials at the time of our visit. Each motor develops 520 b.h.p., and is of the Sulzer two-cycle pure Diesel type, running at 180 r.p.m. In addition, however, there is a 120 b.h.p. Sulzer two-cycle airless injection engine operating at 350 r.p.m. and driving a generator.

The second engine is now approaching completion in the builders' works and will carry about 4 tons. The lubricating-oil separator cleanses between 400 and 500 litres per hour. The auxiliary compressor is driven by a motor of about 140 b.h.p. at 270 r.p.m., and the emergency dynamo set by one of the new Benz high-compression engines. About 1,100 tons of fuel oil can be carried in cross tanks and 200 tons in the double bottoms.

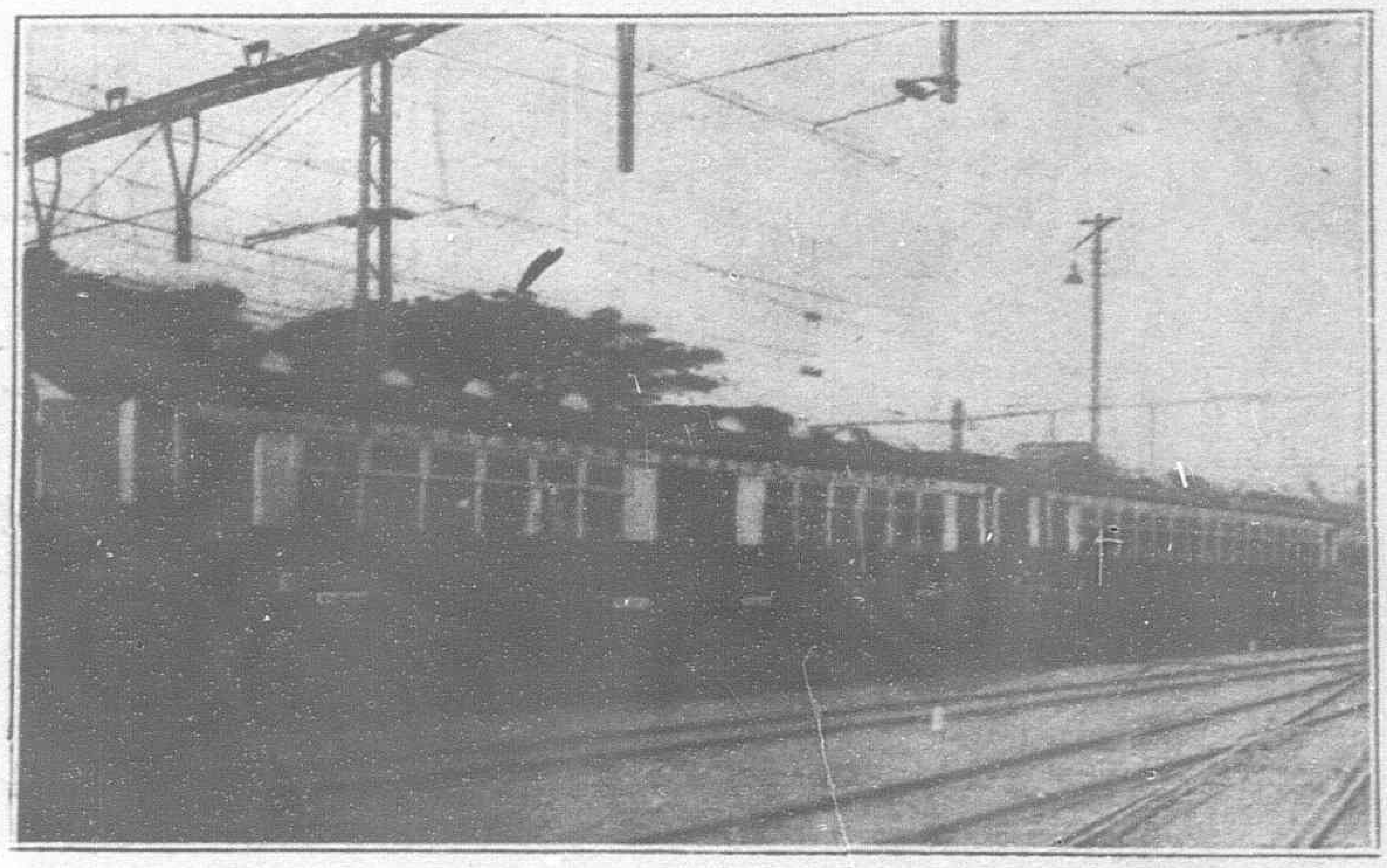
The engines are of exactly the same type as are built by Sulzer's to develop 3,000 b.h.p. at 100 r.p.m., and the speed of 83 r.p.m., was decided upon by the owners to obtain the maximum propeller efficiency. On trials, the fuel consumption for each main engine worked out at 184 grammes per b.h.p.-hour, which is equivalent to 0.405 lb. The lubricating oil expenditure is stated to be 1 gramme per b.h.p.-hour. The fuel consumption given above includes that required for the anxiliaries, such as the scavenging-air pumps and cooling-water pumps.

The accommodation throughout is very comfortably fitted. On the boat deck are 16 lifeboats, which can be lowered by Welin davits, and having a total capacity for 560 people ; there are two motor lifeboats. Not only is a gyroscopic compass fitted, but the Anschutz type of self-steering mechanism is provided. On deck are 16 electric winches, and an unusual point in connection with their design is that they are arranged for regenerative operation. When cargo is being lowered, current is charged back into the line, and it is stated that when this system was adopted on the motor cargo ship *Konigsberg*, built by the Weser Co., a substantial saving in current was effected—to such an extent that, even when operating at full load, only one Diesel-driven dynamo was required to be in service.

The *Fulda* has nine watertight bulkheads, and a Lux Co2 fire-extinguishing plant is installed with 54 steel bottles, each containing 67 lb. of CO2. There is also a Firefoam extinguishing plant in the engine-room.



A Typical Station on the Electrified Section of the Java State Railways



Motor Car (at the right) and Trailer with Equipment of the General Electric Company in the Suburban Passenger Service of Batavia, Java

Suburban Railway Electrification in Java

STEAM railroads in Java are handicapped by the cost of fuel. There is no coal native to that country, and the neighboring island of Sumatra is depended upon for a supply with consequent expense for transportation and storage. Wood is used to some degree. but the amount available is inadequate. On the other hand, there are natural sources of water power which offer a favorable means for electrifying railroads and eliminating the fuel problem.

Thanks to the foresight and progressive spirit of the government officials, a program has been adopted for the gradual electrification of the state owned railways, and an important section of their sixteen-hundred mile system is now giving electric service. This section centers at Batavia, one of Java's largest and most important cities, located toward the western end of the island within a short distance of the northern seaboard.

Batavia's contact with ocean traffic is through the port Tandjong Priok, a little way to the east, and this is one terminus of the new electrification. To the southeast of Batavia is the city Meester Cornelis, which is the other terminus, and within this busy section of the country railroad traffic is heavy, both as regards passengers and freight.

To handle the through service, a number of electric locomotives have been adopted which are of European manufacture, furnished by such firms as Brown-Boveri of Switzerland, the A.E.G. and Siemens Schuckert Werke of Germany; Heamaf and Werkspoor of Holland; the latter, in combination, using motors furnished by the Westinghouse Company.

Electrification for the suburban passenger service, which represents the heavy part of the passenger traffic on this line, is provided by motor cars and trailers equipped by American firms. The General Electric Company has supplied the equipments for 10 motor cars, and 15 trailers, and the Westinghouse Company those for 5 motor cars. In the latter, the motor-generator sets for lighting and control circuits, and the air compressors for brakes and control are General Electric.

Power for this electrification is generated at a hydro-electric plant from which current at 70,000 volts, 3-phase, is brought over a double circuit supported by steel towers, and Hewlett insulators to two sub-stations, 12 kilometers apart. In one of these, A.E.G. apparatus is installed, and in the other, apparatus of the General Electric Company.

The latter sub-station is located at Meester Cornelis, and has a capacity of 3,000 kilowatts. There are two 1,500-k.w. G-E. synchronous motor-generator sets to which a third is to be added latter. These are of the 3-unit, 4-bearing type. Transformers step down the 70,000 volts to 6,000 volts for the synchronous motor, and the latter is direct-coupled to two d-c. generators, each with an exciter at its end of the shaft. The generators are connected in series to produce 1,500 volts for the trolley circuit, the adoption of the 1,500-volt d-c. system being the result of long preliminary study given by the government engineers to electrified systems in Europe and the United States.

The substation building is divided into two separated sections, in one of which is located the 70,000-volt equipment, and in the other the 6,000-volt apparatus. Cables laid underground connects the secondaries of the power transformers in the one section to the 6,000-volt bus in the other section of the building. All the switching operations are controlled from two switchboards in the 6,000-volt section. High-speed circuit breakers protect the generators from short circuits on the line. They are located close to the generators, one being connected to the positive, and one to the negative side of each, and one on each positive feeder. In the high tension wing of the building the transformers and oil circuit breakers are on the ground floor, and the high tension bus and disconnecting switches are on the second floor.

The overhead trolley construction is of the catenary type, and copper is used for the catenary and droppers, as well as for the trolley wire. This part of the system was supplied by the Siemens-Schuckert Company.

Each motor car carries two pantograph collectors, operated by air pressure, one of them being considered a spare. The G-E motors, of which there are four per car, are rated at 115 h.p., 750 volts, and operate two in series from the 1,500-volt supply. Rheostatic braking is provided in addition to air brakes and hand brakes. The control of the motors is through the Sprague-General Electric system. A motor-generator set supplies current at 65 volts for lights, fans, and control circuits. The trailer cars are equipped with controllers so the multi-unit trains may be operated from either end. Normally each motor car pulls a single trailer, but in practice they have already been called upon to draw additional trailers, due to the heavy traffic.

The cars being intended for fast local service, have been built to reach a speed of 90 kilometers per hour, but the normal conditions call for 75 kilometers per hour.

The section electrified has 32 single-track miles, including parallel tracks and sidings, and is practically free from grades. The major portion is double tracked, but the approach to the terminal station at Tandjong Priok, and the yards at Meester Cornelis have five tracks. The track gauge is 3-ft. 6 inches, and 90-pound rails are used.

Electric operation of this Batavia suburban section was started in April of the present year. The opening of the road was an occasion of great enthusiasm on the part of the people, hundreds of whom ran excitedly along the right of way shouting at the top of their voices, while others thronged the trains to more than full capacity, enjoying the novelty of a ride in cars of the most modern equipment, and expressing particular appreciation of the electric

(Continued on page 144.)

Japan's Foreign Trade Establishes New Records

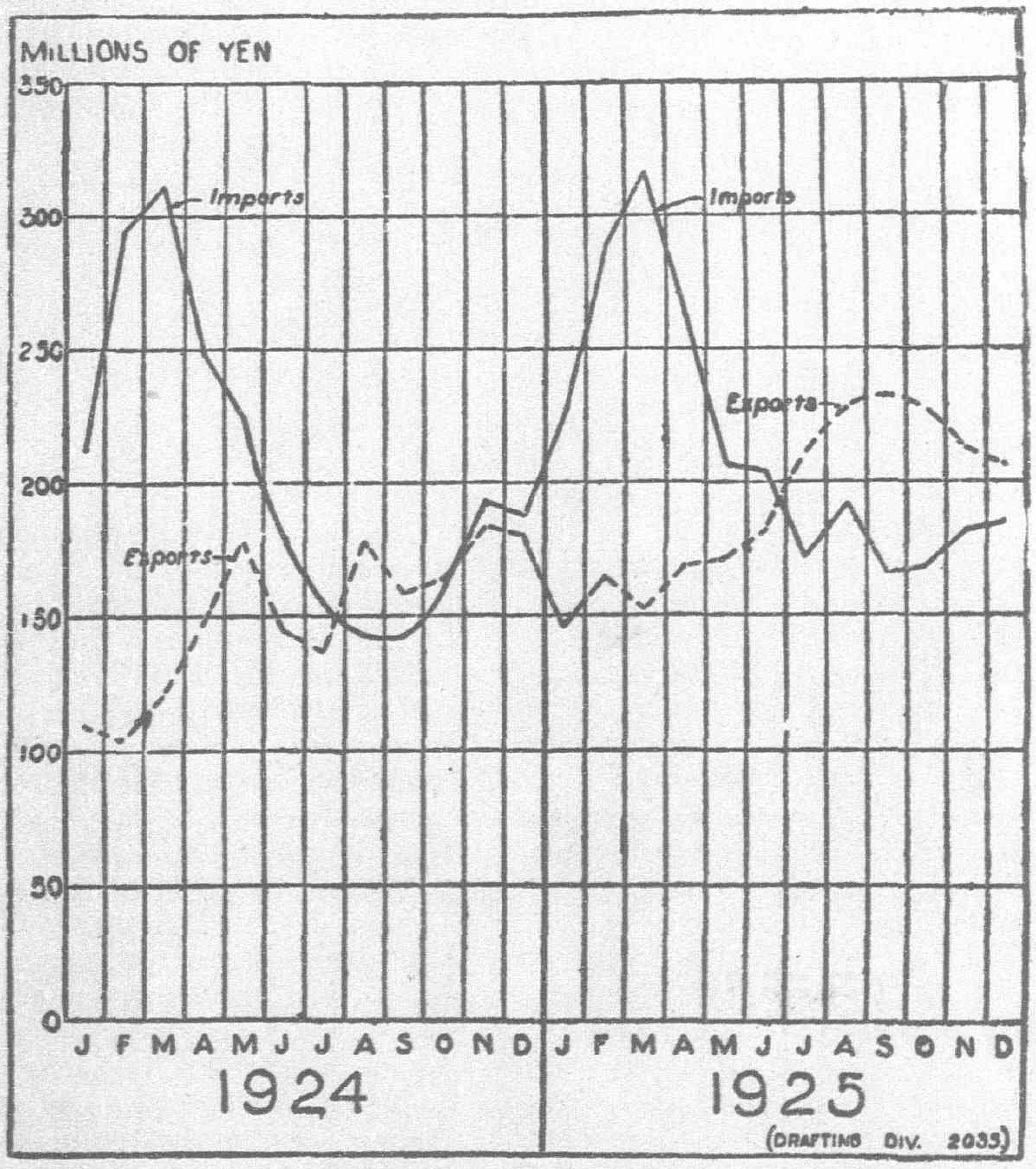
Steady Upward Trend in Exports—Adverse Trade Balance Reduced—United States Leading Country of Origin and Destination

Pual P. Steintorf, Far Eastern Division

THE foreign trade of Japan during 1925 surpassed all previous records. Exports totaled Y.2,304,787,000 ($945,884,584), an increase of nearly Y.500,000,000 in comparison with 1924. Imports amounted to Y.2,570,616,000 ($1,054,939,766)—more than Y.117,000,000 ($48,016,800) greater than for the previous year. The excess of imports was reduced to Y.265,729,000 ($109,055,181), a drop of approximately Y.380,000,000 ($155,952,000) compared with 1924.

Steady Growth of Exports—Imports Fluctuate

A comparison of the trade by months for the past two years shows a steady upward tendency in exports, from a low point of Y.105,000,000 ($43,092,000) in February, 1924, to a peak of Y.232,000,000 ($95,212,800) in September of the past year. Every month of 1925 exceeded by a substantial margin the corresponding period of 1924—an important feature of the year's trade.

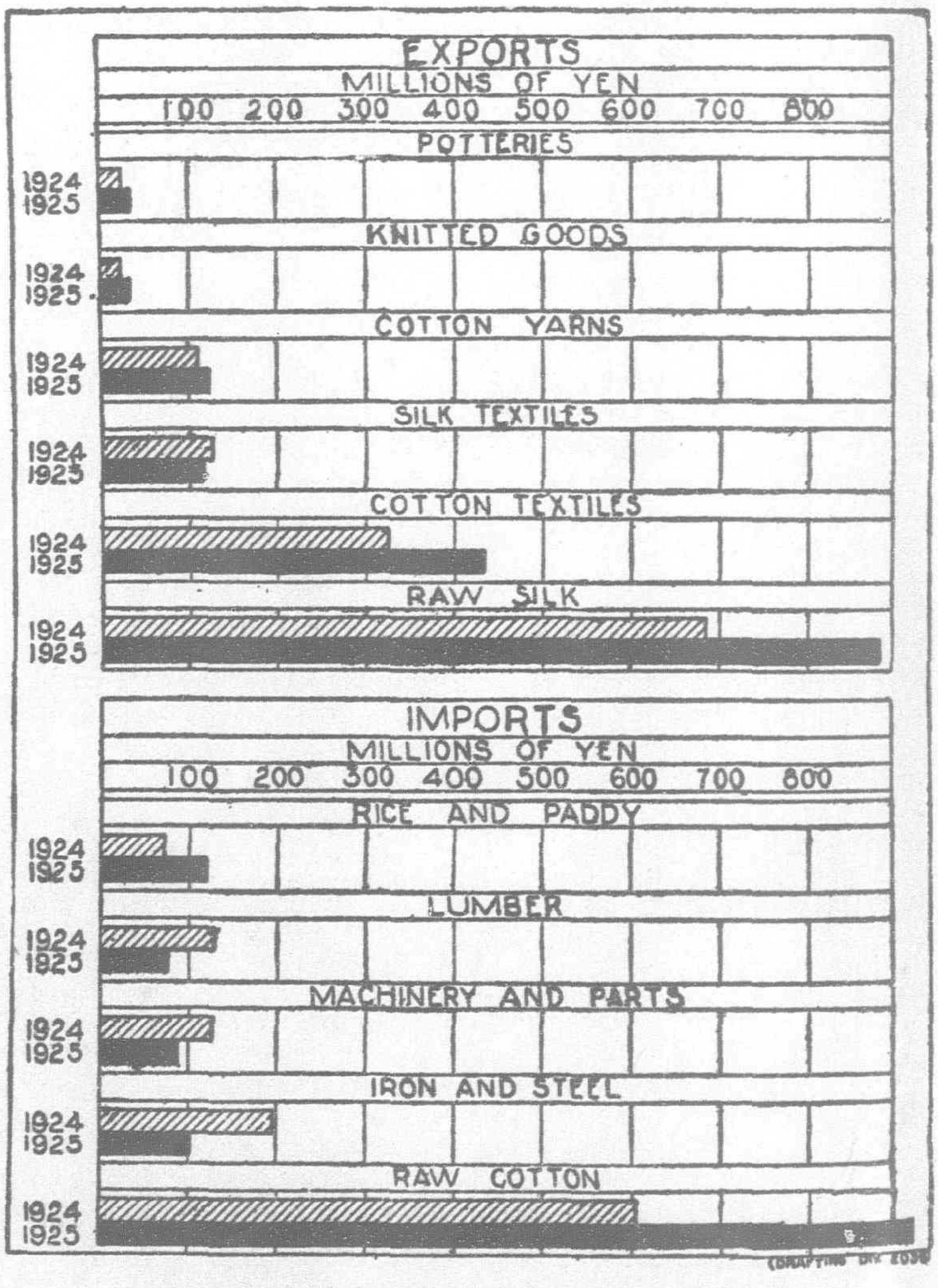


Japan's Trade, by Months

There was a remarkable similarity in the trend of imports during the two years, in both cases the high point having occurred in March followed by a gradual decline until September, and then an upward trend during the later months of the year. The rise in August, 1925, is the only important difference in the course of trade during the two years. The accompanying chart illustrates this tendency.

Exports Influenced by Exchange—Record Shipments of Raw Silk and Textiles

During 1925 export trade was favorably influenced by exchange, which continued during the greater part of the year to be 15 to 20 per cent. below par. The average for the period was $0.4104, compared with $0.4119 in 1924 and a par of $0.4985. Other factors were the favorable conditions obtaining in American and Asiatic markets—particularly the United States, which took record quantities of Japanese raw silk, and China, where the political disturbances seem to have reacted in favor of Japan.



Japan's Trade by Principal Commodities, 1924-25

The outstanding feature of the export trade was the unprecedentedly heavy shipment of raw silk—58,445,000 pounds valued at Y.880,680,000 ($361,431,072), according to preliminary returns, and representing gains over 1924 of 8,783,400 pounds and Y.195,315,000 ($78,399,400). Of this amount 56,382,000 pounds, or approximately 95 per cent., went to the United States. Cotton textiles also had a banner year, the total valuation having been Y.433,000,000 ($177,703,000), an increase of 32 per cent.

over 1924. Similarly, substantial gains were recorded for most other leading export commodities, the only important exception having been silk textiles.

Change in Character of Import Trade

Although the monthly import totals and the aggregate valuation for the past two years were substantially the same, there were a number of important changes in the character of the trade, as revealed by the accompanying chart and also the comparative table of principal import commodities, which show a remarkable rise in raw cotton and rice and more or less substantial declines in nearly every other item. This is a result of many and diverse causes of which the most important was the influence of reconstruction requirements. During the first half of 1924 the demand for reconstruction materials was at its peak but since that time there has been a gradual downward trend as temporary construction has been completed and permanent rebuilding continues to be delayed. A sharp decline in the 1925 totals for such items as iron and steel materials and lumber, accordingly, is evident, which, however, represents a comparison only with the abnormal year of 1924 and not with a similar preearthquake period. The same condition accounts to some extent for the decline in imports of machinery during 1925.

Next in importance has been the depreciation in Japanese exchange, which has naturally tended to limit imports by increasing the cost in yen of all imported commodities. Another factor has been the strong movement to encourage home industry and balance the country's foreign trade. Finally, the changes in tariff rates have exerted some influence on trade. The most important of these were the special duty exemptions on a wide variety of reconstruction materials during the first quarter of 1924 and the putting into effect of the so-called " luxury " tariff on July 31 of the same year.

Imports and Exports by Commodities Summarized

The difference in the trade of the two periods is shown in the following table as well as in the preceding chart :

Japan's trade by commodities in 1924 *and* 1925.

[In thousands of yen*]

Item	1924	1925†	Item	1924	1925†
EXPORTS			IMPORTS		
Rice and paddy	1,100	8,332	Rice and paddy	70,866	120,495
Sugar, refined	28,864	32,005	Wheat	73,897	70,170
Waste silk	20,825	30,849	Sugar	63,850	74,631
Raw silk	685,365	880,680	Oil cake	103,646	106,237
Cotton yarns	109,611	123,073	Raw cotton	605,275	922,797
Silk textiles	125,840	116,889	Lumber	129,073	76,481
Cotton textiles	326,587	432,888	Woolen yarns	63,490	55,826
Knit goods	22,020	30,771	Iron and steel products	195,954	100,923
Potteries	25,437	35,143	Oil, petroleum	17,458	12,892
Aquatic products	22,488	24,590	Woolen textiles	61,647	57,226
Iron and steel	6,546	7,810	Machinery and parts	128,523	88,955
Iron and steel manufactures	12,805	14,694	All other	939,723	883,883
Machinery	9,632	9,770			
Rubber tires	3,239	9,507			
All other	406,676	547,786	Total	2,453,402	2,570,516
Total	1,807,035	2,304,787			

Declared Exports to the United States Show Big Gain

Declared exports to the United'States reached a total value of $400,616,000—an increase of nearly one-third in comparison with the preceding year, according to the figures supplied by the American Consul-General in Tokyo. This increase was attributable almost entirely to raw silk as shown by the following table :

Declared exports from Japan to the United States.

Item	1924	1925
Raw silk	$261,612,000	$338,616,000
Waste silk and textiles	13,293,000	13,052,000
Chemicals and drugs	5,333,000	5,031,000
Tea	4,560,000	4,655,000
Cotton piece goods	2,492,000	1,948,000
Earthenware and glass	3,466,000	3,669,000
All other products...	20,642,000	33,648,000
Total	$311,398,000	$400,619,000

Trade by Countries Compared

The following table shows the value of the trade by principal countries for the two periods :

Japan's trade by countries.

[In thousands of yen]

Item	11 months ended November 30--		Item	11 months ended November 30—	
	1924	1925		1924	1925
EXPORTS			IMPORTS		
China	322,801	435,149	China	208,152	194,995
Kwantung Leased Territory	66,162	95,441	Kwantung Leased Territory	160,209	164,103
British India	121,153	154,977	British India	376,143	561,417
Straits Settlements	20,494	39,756	Straits Settlements	28,883	32,339
NetherlandsEast Indies	53,932	78,407	NetherlandsEast Indies	81,835	89,982
Hongkong	71,435	67,651	French Indo-China	16,965	48,292
Philippine Islands	20,956	26,609	Asiatic Russia	14,043	12,351
Great Britain	55,596	54,158	Philippine Islands	16,606	15,260
France	81,513	54,064	Siam	17,373	23,463
Germany	7,389	11,222	Great Britain	293,277	212,346
Italy	5,568	7,284	France	30,927	30,323
United States	655,175	904,284	Germany	134,603	112,217
Canada	13,676	19,011	Belgium	27,972	11,051
Egypt	24,548	23,924	Switzerland	21,160	19,334
Australia	37,718	44,260	Sweden	14,856	11,257
Hawaii	5,004	7,683	United States	615,871	599,605
All other	63,503	73,806	Canada	36,183	29,490
Total	1,626,623	2,097,686	Chile	5,056	5,145
			Egypt	14,862	29,606
			Australia	107,678	141,571
			All other	43,556	42,724
			Total	2,266,210	2,386,871

Many Changes in Countries of Origin and Destination

Preliminary totals of Japan's trade by countries for the first 11 months of 1925 indicate a number of important changes in the relative position of the various countries. Exports from Japan to all of the important Asiatic countries, except Hongkong, show a very marked increase. China leads with a gain of Y.113,000,000, or approximately 35 per cent., followed by British India with Y. 33,000,000, or 25 per cent., and Kwantung Leased Territory with Y.29,000,000, or 45 per cent. Among European countries there were declines in shipments to Great Britain and France and gains for Germany and Italy. The United States maintained a position of overwhelming importance, accounting for Y.904,284,000 ($371,118,000) or nearly one-half the total exports of the country, and representing an increase of nearly 40 per cent. compared with the corresponding period of 1924.

The United States continued to be the most important source of Japan's imports, although the total valuation of Y.599,605,000 ($246,078,000) represents a decline of 2.5 per cent. compared with the same period of 1924. Imports from British India jumped nearly 50 per cent. during the 1925 period owing to Japan's heavy takings of Indian raw cotton. For the same reason imports from Egypt doubled. Heavy imports of rice account for the gains of Indo-China and Siam, and of sugar, tin, and rubber for advances recorded in the case of the Straits Settlements and Netherlands East Indies. Disturbed political conditions prevented China from equaling its 1924 record. There were marked declines in imports from the leading European countries, including a drop of Y.81,000,000 ($33,242,000), or 27 per cent., for Great Britain ; Y.22,000,000 ($9,244,000), or 16 per cent., for Germany ; and Y.16,000,000 ($6,566,000), or 60 per cent., for Belgium.

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*Average value of the yen : 1924, $0.4119 ; 1925, $0.4104.

† All 1925 figures are preliminary and subject to later revision.

For Engineers

WE have received from Reyrolle & Co., Ltd. an interesting booklet entitled, "Automatic Electric Service." The introduction to the catalog states the following :—

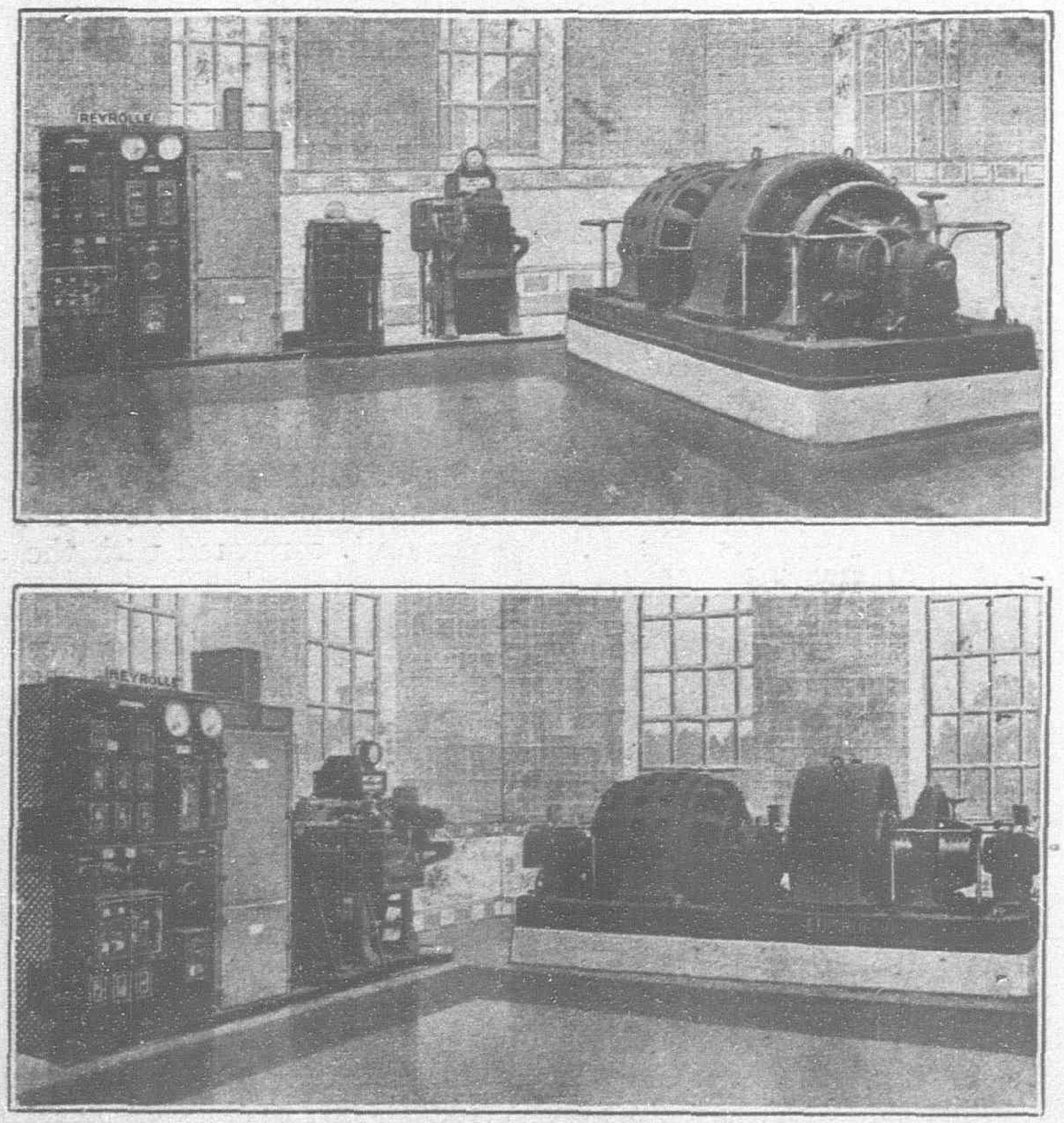
Complete automatic control of sub-station plant has now been given a trial under various working conditions, both at home and abroad, and has justified its installation in the most convincing manner. As is usually the case with new developments, the original installations involved much multiplicity and complication of equipment, and occupied a considerable amount of space. Progress has been made in the important work of simplification, until the present day Peebles-Reyrolle Automatic Sub-station is so simple and straight forward, and occupies so little space, that the past difficulties and complications are forgotten, and the design of a completely automatic sub-station, like many another problem once it is solved, appears so easy that one wonders why the early pioneers did not lay down the first converter sub-station with automatic control.

It is generally agreed among Electric Power Supply authorities that sub-station equipment capable of starting, stopping and controlling itself according to predetermined conditions is ideal for the supply of direct current for traction, lighting and power purposes to new districts and for the strengthening of existing direct current networks at the points where strength is most required.

Progress in this direction must finally lead to the obsolescence of the group sub-station with its long direct current feeders, and leave in its place a chain of single, or at most, double unit self controlling sets housed in the simplest structures possible, and under the routine inspection only of a daytime staff.

The description embodied in this pamphlet records an instance of close and successful collaboration by two thoroughly British firms, Messrs. A. Reyrolle & Co., Ltd., of Hebburnon-Tyne, and Messrs. Bruce Peeble & Co., Ltd., of Edinburgh, both well-known for the reliability and robustness of their products, who have appreciated the requirements of the supply industry to an extent which has made their typical joint production—the "Peebles-Reyrolle Automatic Motor Converter Sub-station Equipment"—one of the outstanding products of British Engineering.

The adaptability, robust construction and efficient service of the Motor Converter is sufficient reason for its inclusion in an automatic equipment.



Typical Traction Substations

The controlling switchgear is an adaptation of the well-known Reyrolle Metalclad Switchgear with electrical control, and all the individual relays and devices by which predetermined conditions control the starting and stopping of the machine are of the simplest possible nature and of the same high standard set by Reyrolle gear throughout the world.

These, then, are the lines upon which the joint authors, Messrs. Bruce Peebles & Co., Ltd., and Messrs. A. Reyrolle & Co., Ltd., have ventured to enter the field of automatic service, and the success of the equipments already installed shows that they have given this problem all the care and thought which have hitherto characterised their individual products, and which are typical of the thoroughness of British design.

It is interesting to note that the Peebles-Reyrolle Automatic Motor Converter Equipment is the first entirely British Automatic Sub-station Plant developed and designed in this country. Though designed for use with Motor Converters in the first instance, schemes employing Rotary Converters have been considered with the same thoroughness as the present scheme employing the Motor Converter.

Great Britain claims to be the home of Automatic Service. Semi-automatic Sub-stations have operated successfully in this country for the past twenty years.

Demand for Poor Quality Tea Now Dead

The London Tea Market. 1924-25

FROM OUR LONDON CORRESPONDENT

THERE is now no demand for really poor tea, either in the United States, Great Britian, or Continental Europe. Consumers have thoroughly learnt that there is neither comfort nor economy in using so-called "cheap" tea, and consider quality rather than price in their purchases. Such is the keynote of the review of the tea market for 1924-25 just issued by Brooke Bond & Co., Ltd., London, one of the largest tea-growing and manufacturing concerns in the world.

Twelve months ago tea growers were enjoying a period of prosperity which no one grudged them who was acquainted with the history of the industry during the last thirty years and knew the difficulties which had faced them and which they had finally overcome. Since then the trade has experienced many vicissitudes. In the late summer of 1924 many thought that the Northern Indian crop of the current year would not suffice for requirements until the 1925 crop was available.

As a result wild speculation was induced and prices rose to dangerously high levels. In the late fall of 1924 ordinary common tea touched 1/10½d. (45 cents) per lb. on the London market, but the market received a rude shock when it realized that the closing period of the season was unusually favorable for growth and that many growers had resorted to "free" plucking. Soon large quantities of inferior leaf were being thrown on the market and prices collapsed. Indian producers were not the only offenders. Java sent much tea that should never have been allowed onto the London market, and was not fit to be called tea. Fortunately, most of this sold at prices which certainly taught the shippers a salutary lesson.

Until recently, prices for lower grades have remained on a comparatively low level and in September the market was again very depressed owing to unusually favorable weather in Northern India, the crop showing an increase at this time of over 22,000,000 lbs. Conditions have since changed, and early winter set in, and it seems probable the total crop will show a shortage of 10 to 15 million pounds as compared with last year. Conditions in Java have likewise been very unfavorable compared with last season, but the reverse has been the case in Southern India and Ceylon. Very little China tea has been shipped this season either to America or Europe, and, taking all these factors into consideration, it would appear that while midsummer 1925 found London carrying a surplus of 40,000,000 lbs, about one-half to three-fourths of this should have disappeared by June, 1926. This should leave the industry in a very sound position, but would not justify market prices rising to an extent which would necessitate an advance in the retail price to the public for the medium or better grades of tea. It is to be hoped, says Brooke Bond & Co., that the trade will recognize this and discourage speculation, which is again becoming evident.

Growers of good to fine tea have almost entirely escaped the troubles above enumerated. Probably never before has there been such a strong and sustained demand for fine tea on the London market, both for domestic trade and export, and Brooke Bond & Co. feel there is no doubt this will continue.

Financially, producers were never in as strong a position as at present. Most of them have made food profits during the last three years and have used them prudently. While paying high dividends, they have put the gardens in good order and have amassed cash reserves. On the other hand, however, the cost of production is rising steadily, owing to the higher cost of labor and material and also to the higher standard of living now required by the coolies. This will tend to increase.

As previously, labor still constitutes the planter's worst problem. Shortage of labor affects not only the quantity of the output, but also the quality, as, without adequate force, it is impossible to pick the flushes before they grow coarse. The labor shortage is felt in almost all producing countries, but is especially keen in Northern India, which has never recovered from the effects of the 1918 influenza epidemic, when more deaths occurred in India than in Europe during the four years of the war. The steady supply of the overflow population from certain districts of Central India then stopped. There is now little surplus population there. The survivors find sufficient work and prosperity on their own lands and in local industries. Attempts have been made during the last two years to recruit in the Madras Presidency, but the type of coolies drawn from there, and many of them returned to their own country soon after their arrival at the gardens. The number of permanent laborers on tea plantations in Northern India is about 650,000 and in Southern India about 100,000. In Southern India general conditions are more favorable and the industry is progressing. Lately there has been great improvement in manufacture and much really good to fine tea now comes from these districts. As labor is available, a steady increase in crops is expected.

The area under tea in India in 1924 was computed at 710,300 acres. Valuable work is done by the Scientific Department of the Indian Tea Association, the expenses of which are defrayed by an annual subscription from the members at the rate of eight annas an acre of the estate of each member. As a result of its investigations red spider has been largely controlled and progress made with regard to mosquito blight.

In Ceylon the industry is flourishing, especially the high elevation gardens, which produce good quality teas. The planters have not suffered from labor troubles, coolies being plentiful and more settled than for some time past. Planters are anxious to keep up the high quality of their produce and are increasingly careful in factory methods. Large sums have been spent on building new and spacious factories, and on better houses for the coolies. The establishment of a tea research institute is contemplated, where careful study of soil, manures, etc., may be made by experts. It is thought by some that such knowledge might have saved the coffee and cinchona industries.

Efforts are being made to stop, or at least control, the export and sale of factory sweepings and of inferior teas mixed with other leaves and coloring matter.

Ceylon planters have for some years considered the adoption of a tea cess, similar to that existing in India. The suggestion is growing in favor. The money collected would be used for advertising Ceylon tea, especially in Australia and New Zealand, where Java planters are making great efforts to push their produce.

The principal other places in the British Empire which produce tea are Nyasaland and Kenya, in both of which countries some little progress is being made. The chief difficulty in Kenya is the supply of labor and unless the Government takes some steps to see that sufficient labor is available the industry will not progress. The labor must be permanent, as the plucking and manufacture of tea is continuous, which is not the case with coffee. It would be a great pity if that which would probably become an important industry should languish through official apathy. In Nyasaland the labor problem is easier, but so far the quality of the tea grown is disappointing.

The Union of South Africa still produces tea, but of poor quality and all used locally.

Large quantities of tea are grown in Java and Sumatra, but the exports from these islands do not approach those of India and Ceylon. The planters are enterprising and make great efforts to push their produce, particularly in Australia and New Zealand. The out-turn per acre is greater than in Northern India, where the trees only flush for about eight months in the year, whereas in the Dutch East Indies, as in Ceylon, they flush all the year round. In Sumatra the average out-turn is higher than in Java. The quality from the larger island is also generally better, Sumatra teas obtaining higher prices in London than those of Java. There is plenty of land in Sumatra suitable and available for tea growing, but these districts are thinly populated, and there is difficulty in getting labor, which has to be imported from Java.

A considerable quantity of tea is grown in Japan, but very little comes to Britain. The greater part of the exports go to the United States. Owing to the high cost of labor the industry is languishing.

It is impossible to estimate the amount of tea grown in China. The quantity imported by the United Kingdom is very small. It does not amount to three per cent. of the consumption of the British Isles. During the year under review business has been carried on in China under great difficulties, owing to the country's internal strife. The Chinese are very persevering and have managed to carry on growth and manufacture under circumstances that would probably have caused cessation of business in many countries.

A little tea is grown in Persia and the Persian Government is considering the possibility of increasing the cultivation of the plant and intends approaching the Dutch Government with the view of engaging an expert to superintend the new gardens. The district at present under tea borders the Caspian Sea. The first shrubs planted there were brought from India.

It would be a strange experience, says Brooke Bond & Co., should it ever be recorded that the consumption of tea was decreasing. At present it is increasing, in some places rapidly, in other more slowly. Great Britain and her possessions take the lead. In 1913 the per capita consumption in Great Britain was 6.68 lbs ; at present it is 8.61 lbs. In Great Britain and the whole of Ireland, the consumption works out at 8.76 lbs. per head. The people of Australia have long been known as the greatest tea consumers in the world. Tea is served six or seven times daily, and " morning tea " (not to be confused with the cup most colonials drink before breakfast) is as great an institution as afternoon tea in Great Britain. To invite people to morning tea at the fashionable restaurants is a favorite way of entertaining.

In the Irish Free State the tea tax has been abolished. This will doubless cause increased consumption. The Irish, as is well known, are particular about their tea. Much of the finest Assam tea goes there, and there is little demand for poor teas.

In the United States consumption rose last year from 0.88-lb. to 0.93-lb. a head and is now nearly as high as before the war. At that time, however, 85 per cent. of the tea drunk came from Japan and China. More than 45 per cent. now comes from India, Ceylon, and the Dutch East Indies. Although increase in consumption is still slow in America, it may, Brooke Bond & Co., thinks, be greater than appears on the surface, as it is entirely in black teas from the East Indies, a small quantity of which will produce much more liquid than the China or unfermented teas which are being displaced.

In 1916-17 Russia took over 50,000,000 lbs. from Calcutta, 25,000,000 lbs. from Ceylon, and 25,000,000 lbs. from Java. This was exclusive of dusts shipped to Hankow and not to Russia direct. For some years she disappeared from the market altogether, but during the last two or three years tea has entered the country by various routes, and the revival of the tea trade with Russia is undoubtedly one of the most important and significant events in the industry a present. Russian orders are being executed at practically every auction sale in London, Calcutta, and Colombo. Shipments have also been made from Java. In addition, dust and fannings are being shipped to China, showing that the very important brick tea industry at Hankow is being revived. The Russian buyers state that a steady increase in their buying power is assured. During the nine months January to September, 1925, re-exports from London to Russia totalled 8,250,000 lbs. in comparison with 2,000,000 lbs. in the corresponding period of 1924.

In Continental Europe consumption increases, although slowly. Germany is one of the most promising markets and fair quantities of all growths are being taken, including a good proportion of fine to finest. German buyers are keen judges of quality and flavor and no doubt are doing a growing export trade with countries contiguous to their frontiers.

In Holland and parts of Belgium the tea-drinking habit is general. To ensure getting good quality the public very largely purchase recognized proprietary packet teas, which contain good blends made up very much on English lines.

In March, 1924, the Indian Tea Cess Committee voted £20,000 for pushing the sale of Indian tea in France during 1924-25. Active propaganda has been carried on and it is stated that " Five o'clock Tea " is becoming popular, but, from the accounts of tourists, it is still difficult to get a good cup of tea in many parts of France. Also as a whole the nation does not seem inclined to give up coffee and take to tea. This is probably owing to the art of tea-making not being generally understood in many parts of France and partly owing to the sale of very poor China and Annam tea. It is a pity the French colonial planters cannot improve the quality of Annam tea. It would then be attracted to other markets and not be entirely consumed in France (where it is often sold under India Ceylon labels). These poor quality teas, together with low-grade Chinas, do a great deal of harm to the propaganda and retard the increase in the demand. Having once tasted these poor teas, it is quite understandable why the French do not take to tea.

In North Africa the advance in the amount of tea taken is steadily increasing and a feature is the increase in the demand for black tea, although green tea still holds its own in many parts. The Central African native is also taking to tea when he can get it and no doubt this continent will in time become an important consumer.

South America does not show much progress except Chile, where increased quantities are being imported.

Exactly how much tea is drunk in India it is impossible to state, as purchases for consumption there do not appear in any published record, but the Calcutta brokers' contracts support the statements of the Indian Tea Cess Committee that consumption is increasing. The efforts of the committee are concentrated at present almost entirely on small towns and villages and on the railways, as it is thought that hte habit is established in the large towns, despite all that has been done, however, the amount taken by the natives still stands only at three ounces per head per year. Unfortunately, the demand is almost entirely for very low price tea, which encourages the sale of sweepings and rubbish. The Cess Committee advises the adoption of a standard, below which no tea should be allowed to be sold as tea, but should be denatured and disposed of for chemical purposes. Bengal has prescribed such a standard, which if enforced should check the sale of rubbish and bad tea in that part of India.

The outlook for the producer, it will be seen, continues bright. The world will almost surely take more tea during 1926, but it must be up to standard.

Suburban Railway Electrification in Java

(*Continued from page 139.*)

fans that served to mitigate the discomforts of railroad travel in the tropics.

The success of this undertaking reflects great credit upon Dr. de Gelder, Chief of State Railway Electrification, and upon his staff. The erection of the sub-station described was under the personal supervision of Mr. J. R. Johnson, of the General Electric Company, and Mr. E. E. Carrier, of the same company, had charge of the installation of the G.E car equipments.

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